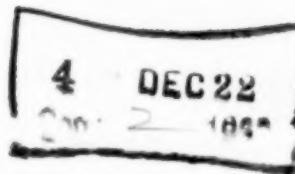


RADIOLOGICAL HEALTH DATA



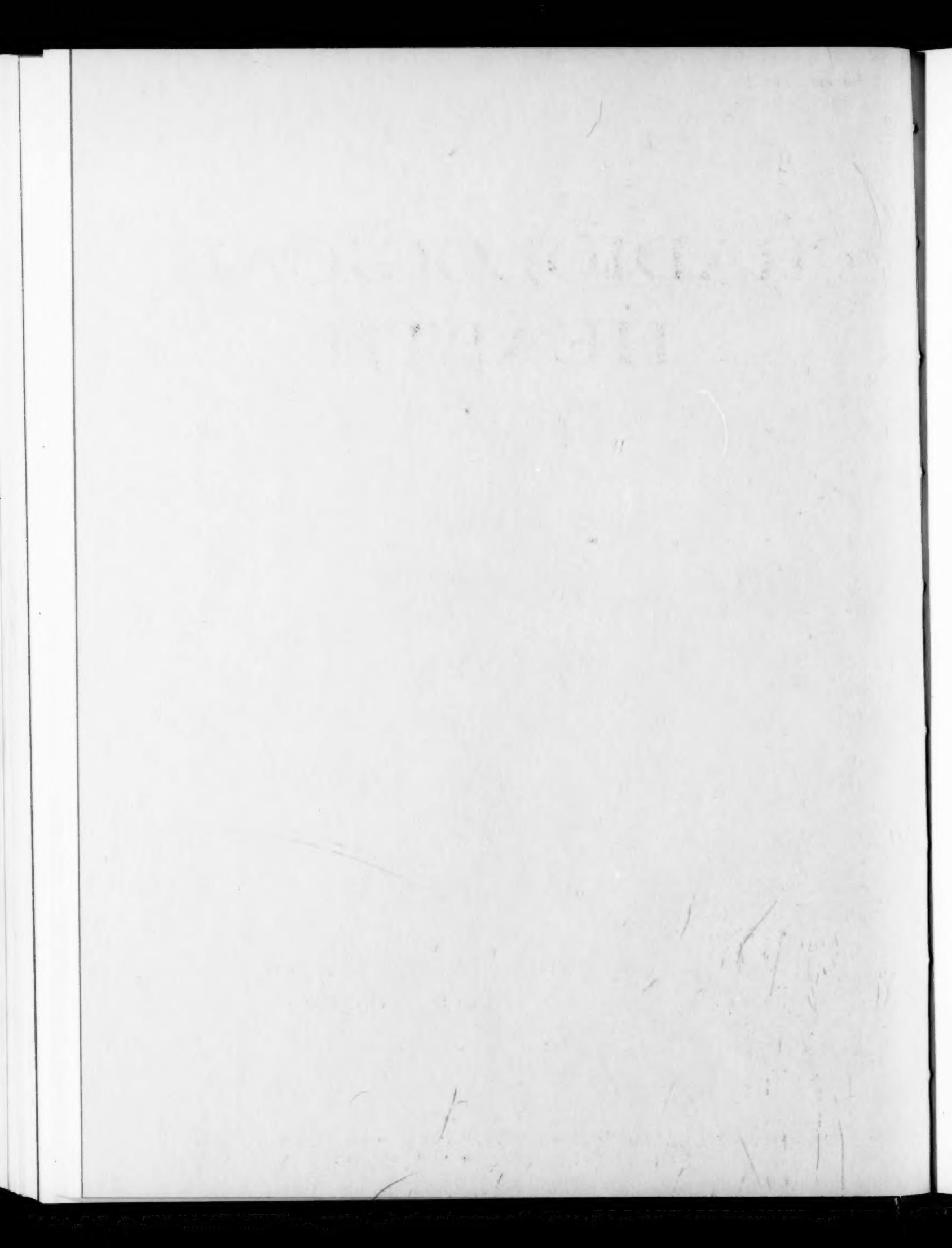
MONTHLY REPORT

September 1960



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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RADIOLOGICAL HEALTH DATA

MONTHLY REPORT

SEPTEMBER 1960

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

Division of Radiological Health

PREFACE

In August 1959, the President directed the Secretary of Health, Education, and Welfare to intensify Departmental activities in the field of radiological health. The Department was assigned, among other things, primary responsibility within the Executive Branch for the collation, analysis, and interpretation of data on environmental radiation levels. Within the Department this responsibility has been delegated to the Division of Radiological Health, Public Health Service.

As a step in the discharge of this responsibility, the Public Health Service is publishing *Radiological Health Data*. This publication is issued monthly, with each third issue (starting July 1960) expanded somewhat into a quarterly report.

The monthly and quarterly reports are reviewed by a Board of Editorial Advisors with representatives from the following Federal agencies:

Department of Health, Education, and Welfare
Atomic Energy Commission
Department of Defense
Department of Commerce
Department of Agriculture

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SECTION I.—MILK

PUBLIC HEALTH SERVICE MILK MONITORING PROGRAM

The original Public Health Service Milk Monitoring Program consisted of 12 sampling stations. This is now being expanded to about 60 stations. Since the sampling procedures for the original and the added stations are somewhat different, they will be described and reported separately. The Public Health Service Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, conducts the analyses for the original network stations and the Public Health Service Southeastern Radiological Health Facility, Montgomery, Alabama, and the Southwestern Radiological Health Facility, Las Vegas, Nevada, for the added stations.

Original Stations

The initial purpose of establishing this network was in keeping with the normal and continuing program of the Department of Health, Education, and Welfare to determine trends in our changing environment, including measurement of amounts of radioactivity in water, air, milk, and other foods. Milk was the food chosen for initial testing since it is among the most important elements of the diet and is constantly available at all seasons of the year and in all climates. A primary objective of the project was to develop and simplify methods of collection and radiochemical analysis of milk to make them more suitable for larger scale programs.

The selection of the original sampling stations was based on the following criteria:

1. The milk represented in each sample was from a group of farms milking a total of at least 1,000 cows.
2. The number of individual farms was small enough so that collection of collateral field data from each farm was feasible.
3. The milk samples were from a supply that was part of a metropolitan milkshed.
4. The conditions under which the milk was received were such that each sample was representative of the same farms in the production area.

The Overton, Nevada and St. George, Utah milksheds do not fulfill the 1,000 cow minimum requirement but have been included since they are part of the monitoring program around the Nevada Test Site.

One gallon samples are collected once each month and forwarded by air parcel post to the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, for radionuclide analysis. It is estimated that these samples represent 2,000 gallon lots. The concentration of iodine-131, barium-140, and cesium-137 and naturally occurring potassium-40 are all currently being measured when present in the milk by gamma scintillation spectroscopy. Total strontium and strontium-90 are determined following radiochemical separations, and the strontium-90 is calculated by measuring the build-up of the daughter decay product, yttrium-90 (after about a two week wait) using a low background anticoincidence beta counter. The total radioactive strontium is counted in a shielded internal proportional counter with the strontium-89 calculated as the difference.

Publication of the data will normally require a period of about four months after collection due to shipment, processing, decay product build-up, compilation of the data, and inclusion with other radiation data in the monthly reports.

A description of the program appears in "The Occurrence of Strontium-90, Iodine-131 and Other Radionuclides in Milk, May 1957 through April 1958," by J. E. Campbell, G. K. Murthy, A. S. Goldin, H. B. Robinson, C. P. Straub, F. J. Weber, and K. H. Lewis, American Journal of Public Health, Vol. 49, No. 2, Feb. 1959, American Public Health Association, reprinted by the Joint Committee on Atomic Energy Hearings on Fallout from Nuclear Weapons Tests, Vol. 1, May 1959.

Previous issues of Radiological Health Data list references for technical descriptions of the methodology of analyses used.

Table I presents the results of analyses for the original stations for April 1960.

Added Stations

The Milk Monitoring Program is being expanded for the primary purpose of providing additional information on levels of radiation in milk consumed by the public. The new stations are being established in cooperation with State and local health and milk sanitation agencies. The cities have been selected in order to provide adequate coverage from the combined viewpoints of production areas and consuming population. The emphasis on this expanded sampling and radioassay program is that of:

1. Measuring the radioactivity levels of the milk consumed by the public in various regions of the country by obtaining samples of pasteurized and homogenized milk at the point of distribution to the public.
2. Providing one sampling point within each state with additional points when indicated by widely varying conditions of the milk supply or the need to provide coverage of large population groups. This differs from the original set of sampling stations whose selection was based principally upon certain criteria involving the milk production and milkshed area characteristics (see page 1).

In some instances the designated points are the same as those which reported originally. The establishment of the added sampling stations does not preclude the need for further samples from the selected milksheds serving the same cities. It is important that both networks be in operation for a sufficient period of time to provide an overlap for purposes of comparative study.

The sampling procedure has been developed to give a sample from one day's sales per month in a community which will be as representative of the total supply as can be achieved under practical conditions. The sample will be a composite of those plants supplying not less than 90% of the city's milk supply. The contribution from each plant to the total sample will be approximately proportional to volume of milk sold.

The samples from the added stations are collected with the assistance of the various State and local health and milk sanitation agencies and shipped for analysis to either the Southwestern or Southeastern Radiological Health Facility. The Southeastern Radiological Health Facility processes samples from the 30 states east of the Mississippi, and the Southwestern Radiological Health Facility from the States generally west of the Mississippi River.

At the present time radioassays for Sr⁹⁰ and Cs¹³⁷ are being performed. As the laboratories increase their capacities and instrumentation, a selected group of radionuclides of concern to public health agencies will be included for assay as necessary for complete monitoring of the milk supply.

The first set of data from the Southeastern Radiological Health Facility for April 1960 is presented in Table II. Tables III and IV present the March and April data from the Southwestern Radiological Health Facility.

TABLE I.—DATA ON RADIOACTIVITY IN MILK

Public Health Service Milk Monitoring Program
Robert A. Taft Sanitary Engineering Center

April 1960

(Radioactivity in $\mu\text{c}/\text{liter}$)

Area	Calcium grams/liter		Iodine-131		Strontium-89		Strontium-90		Barium-140		Cesium-137	
	April	Yearly average	April	Yearly average	April	Yearly average	April	Yearly average	April	Yearly average	April	Yearly average
Atlanta, Ga.....	1.11	1.15	0	5	0	16	15.8	16.4	0	0	55	74
Austin, Tex.....	1.12	1.11	0	3	0	7	4.4	5.6	0	0	15	36
Chicago, Ill.....	1.18	1.10	0	0	0	10	9.4	9.6	0	0	50	49
Cincinnati, Ohio.....	1.19	1.12	0	<1	0	10	13.5	12.5	0	0	35	42
New York, N. Y.....	1.19	1.08	0	1	0	6	10.2	10.4	0	0	45	48
Overton, Nev.....	1.18	1.08	0	0	0	1	2.6	3.3	0	0	5	25
Sacramento, Calif.....	1.08	1.09	0	0	0	4	4.6	4.2	0	0	10	32
Salt Lake City, Utah...	1.09	1.10	0	1	0	6	7.0	7.7	0	0	55	48
Spokane, Wash.....	1.05	1.14	0	2	0	17	14.9	13.6	0	0	60	66
St. George, Utah.....			No sample collected		0	24	23.4	21.1	0	0	40	66
St. Louis, Mo.....	1.16	1.25	0	0	0	0						

Samples are taken at one sampling point from the milk supply of the areas listed above.

TABLE II.—DATA ON RADIOACTIVITY IN MILK

Public Health Service Milk Monitoring Program
Southeastern Radiological Health Facility

April 1960

(Radioactivity in $\mu\text{c}/\text{liter}$)

Area	Calcium grams/liter		Strontium-90		Cesium-137	
	April	Average to date*	April	Average to date*	April	Average to date*
Burlington, Vt.	1.22	-	12	-	18	-
Charleston, W. Va.	1.13	-	9	-	<10	-
Hartford, Conn.	1.21	-	8	-	<10	-
Louisville, Ky.	1.12	-	5	-	<10	-
Manchester, N. H.	1.36	-	16	-	40	-
Pittsburgh, Pa.	1.23	-	14	-	18	-
Syracuse, N. Y.	1.21	-	6	-	15	-

* April sample is initial sample.

Note: Strontium-89 analysis performed, but no significant amounts detected.

TABLE III.—DATA ON RADIOACTIVITY IN MILK

Public Health Service Milk Monitoring Program
Southwestern Radiological Health Facility

March 1960

(Radioactivity in $\mu\text{c}/\text{liter}$)

Area	Calcium grams/liter		Strontium-89		Strontium-90		Cesium-137	
	March	Average to date ¹	March	Average to date ¹	March	Average to date ¹	March	Average to date ¹
Albuquerque, N. Mex.	1.2	-	2.0	-	2.7	-		
Denver, Colo.	1.1	-	0	-	7.8	-		
Idaho Falls, Idaho	1.1	-	8.9	-	4.0	-		
Las Vegas, Nev.	1.1	-	0	-	2.7	-		
Palmer, Alaska	1.1	-	0	-	5.0	-		
Salt Lake City, Utah	1.2	-	0	-	8.0	-		

¹ March sample is initial sample.² Zero means calculated value is less than twice error at 95% confidence level.

TABLE IV.-DATA ON RADIOACTIVITY IN MILK

Public Health Service Milk Monitoring Program
Southwestern Radiological Health Facility

April 1960

(Radioactivity in $\mu\text{c}/\text{liter}$)

Area	Calcium grams/liter		Strontium-89		Strontium-90		Cesium-137	
	April	Average to date	April	Average to date	April	Average to date	April	Average to date
Albuquerque, N. Mex. ¹	1.2	1.2	30	0	4.2	3.45		
Denver, Colo.	1.25	1.17	0	0	7.4	7.6		
Honolulu, Hawaii ²	1.1	-	4.8	-	2.1	-	38	-
Idaho Falls, Idaho ¹	1.0	1.05	0	4.4	6.2	5.1	243	-
Kansas City, Mo. ²	1.2	-	14.0	-	6.8	-		
Laramie, Wyo. ²	1.1	-	5.9	-	6.6	-		
Palmer, Alaska ¹	1.1	1.1	0	0	8.0	6.5		
Portland, Oreg. ²	1.0	-	17.5	-	8.6	-		
Salt Lake City, Utah ¹	1.1	1.15	0	0	10	9.0		
Seattle, Wash. ²	1.1	-	16.1	-	4.8	-		
Wichita, Kans. ²	1.2	-	11.8	-	4.6	-		

¹ Average for first two months.² Initial sample.³ Zero means calculated value is less than twice error at 95% confidence level.

STRONTIUM 90 IN DRIED CANADIAN MILK PRODUCTS

The following table, No. V, presents the results of measurements of strontium-90 in Canadian dried milk for the months of January, February and March 1960. This table was included in the Quarterly Report, dated June 1960, published by the Radiation Protection Division of the Department of National Health and Welfare, Canada.

Graphs showing the strontium-90 content, covering the period 1956-59, are also included. These are based on data contained in earlier reports published by the Department of National Health and Welfare, Canada.

These data are reproduced in the present form through the permission of the Department of National Health and Welfare, Canada.

MILK SAMPLING STATIONS
IN CANADA

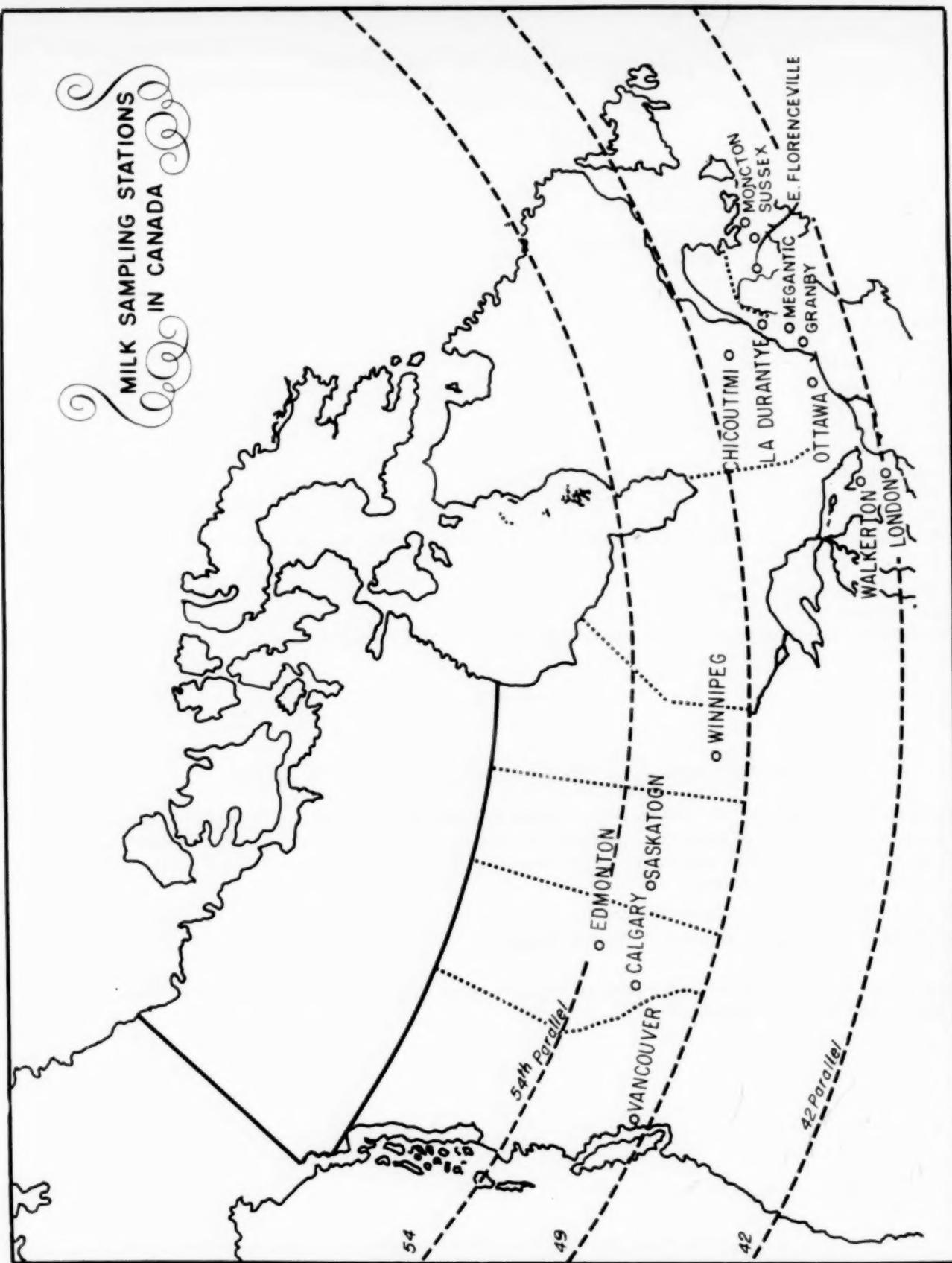


FIGURE 1

TABLE V.—STRONTIUM-90 CONTENT OF CANADIAN DRIED MILK POWDER SAMPLES

Department of National Health and Welfare

(Concentration in Micromicrocuries per gram of Calcium)

Station	1960 January	1960 February	1960 March
Vancouver ¹	17.2	17.6	18.7
Edmonton ¹	16.5	16.6	14.1
Calgary	15.6	15.1	15.0
Saskatoon ²	10.1	12.1	13.2
Winnipeg ²	N.S.	N.S.	12.0
Walkerton	5.1	5.6	6.2
London ¹	5.1	6.3	7.5
Ottawa ¹	10.7	10.9	9.8
Granby ¹	20.2	26.8	19.4
Megantic	20.1	23.1	23.4
LaDurantye	19.9	19.5	21.7
Chicoutimi	16.1	19.5	18.1
Moncton ²	13.6	11.6	13.0
Sussex	18.6	18.6	13.0
East Florenceville	N.S. ³	19.0	15.5
Charlottetown	N.S.	N.S.	N.S.
Average	14.5	15.9	14.7

¹Natural strontium determinations made for these stations. All other stations were corrected for natural strontium using an average factor of 1.06.

²Buttermilk sample. All other samples skim milk.

³No milk powder manufactured for the month.

⁴All values are the result of single analyses and each has an error term of an estimated +6% associated with the analytical method (the contribution due to the method of sampling is not included).

⁵Samples collected by inspectors of the Marketing Division, Department of Agriculture.

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK SAMPLES JAN.- DEC. 1956

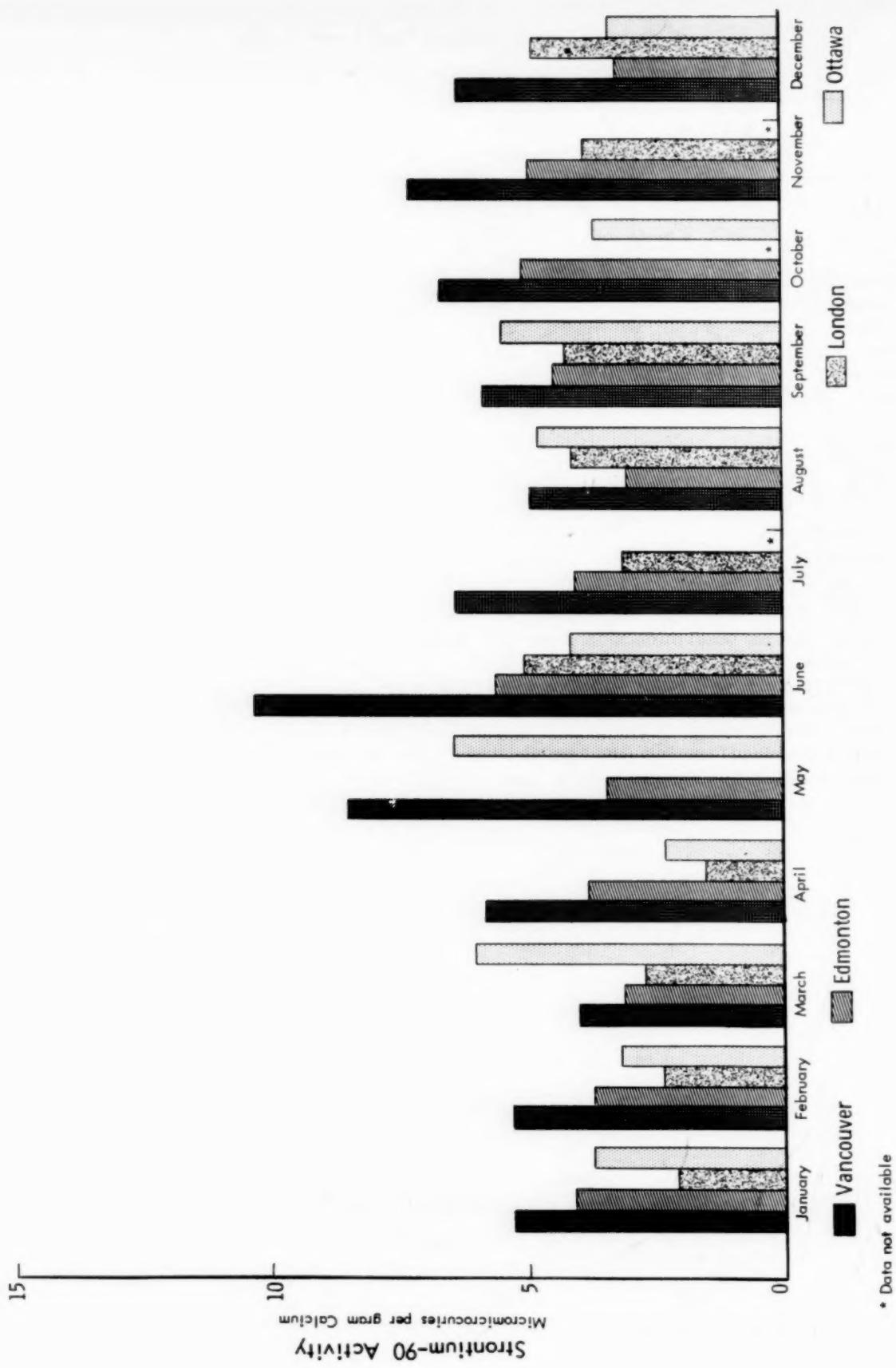


FIGURE 2

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK SAMPLES JAN. - DEC. 1957

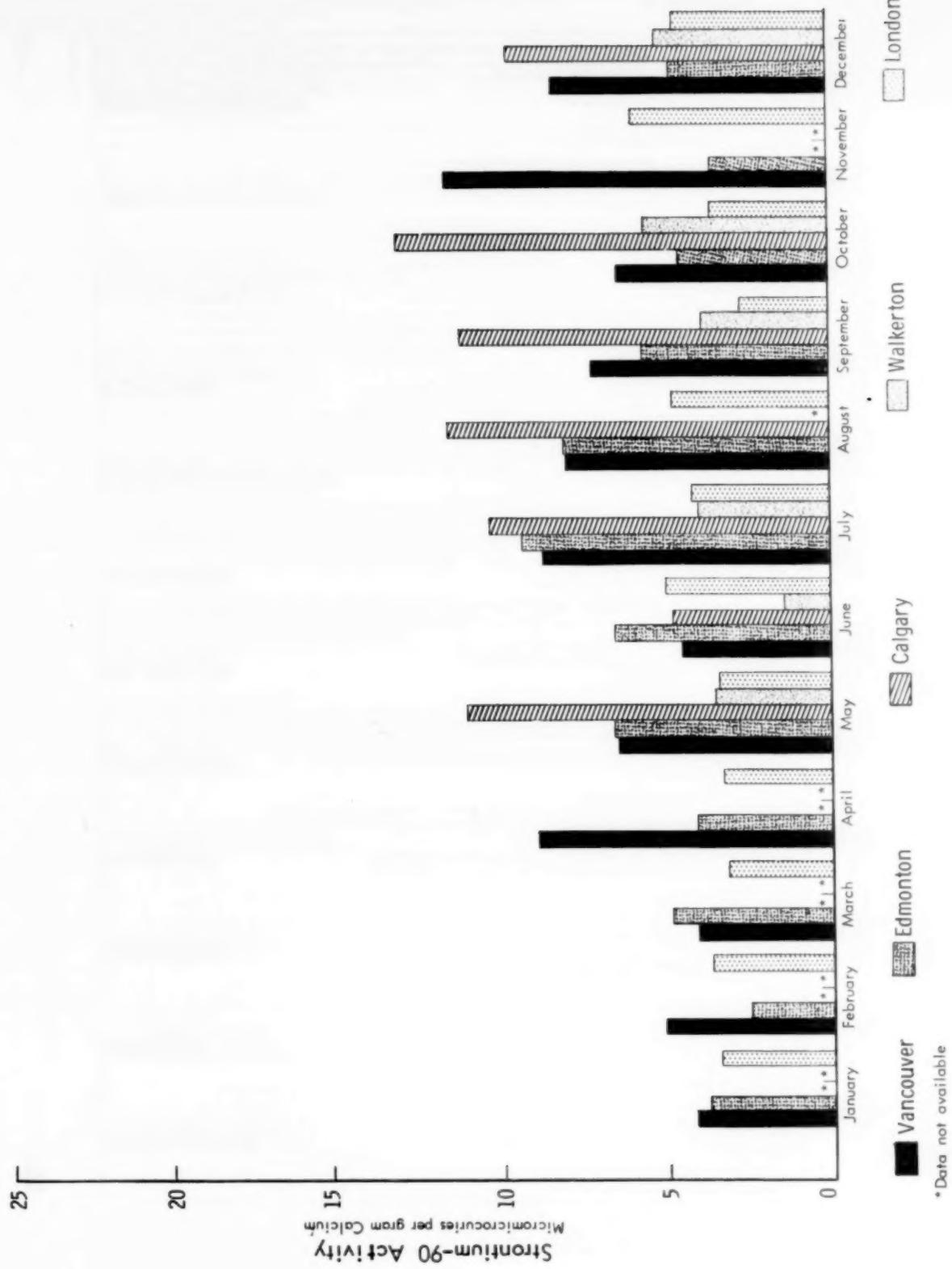


FIGURE 3a

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK SAMPLES JAN. - DEC. 1957

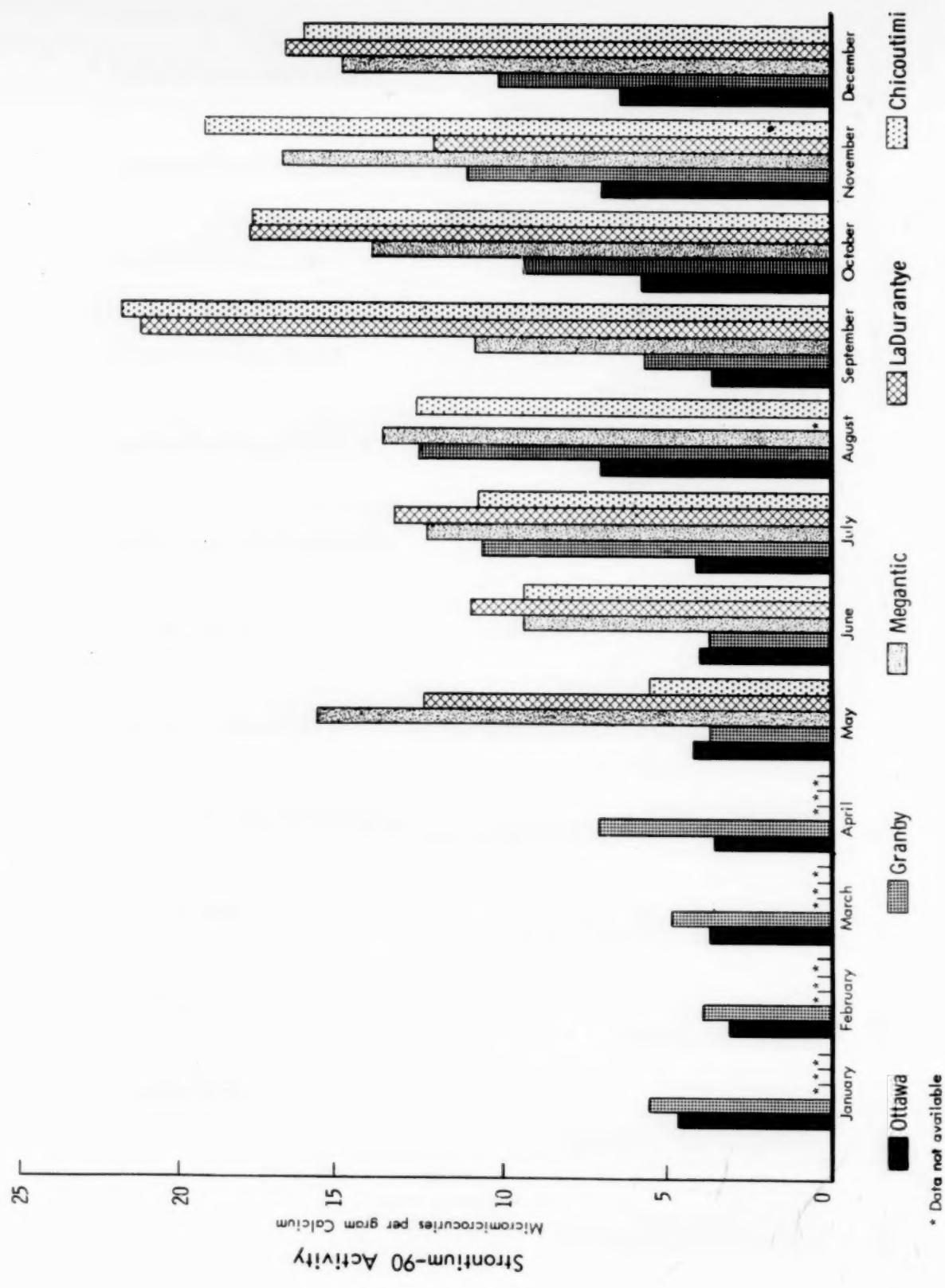


FIGURE 3b

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK SAMPLES JAN. - DEC. 1958

25

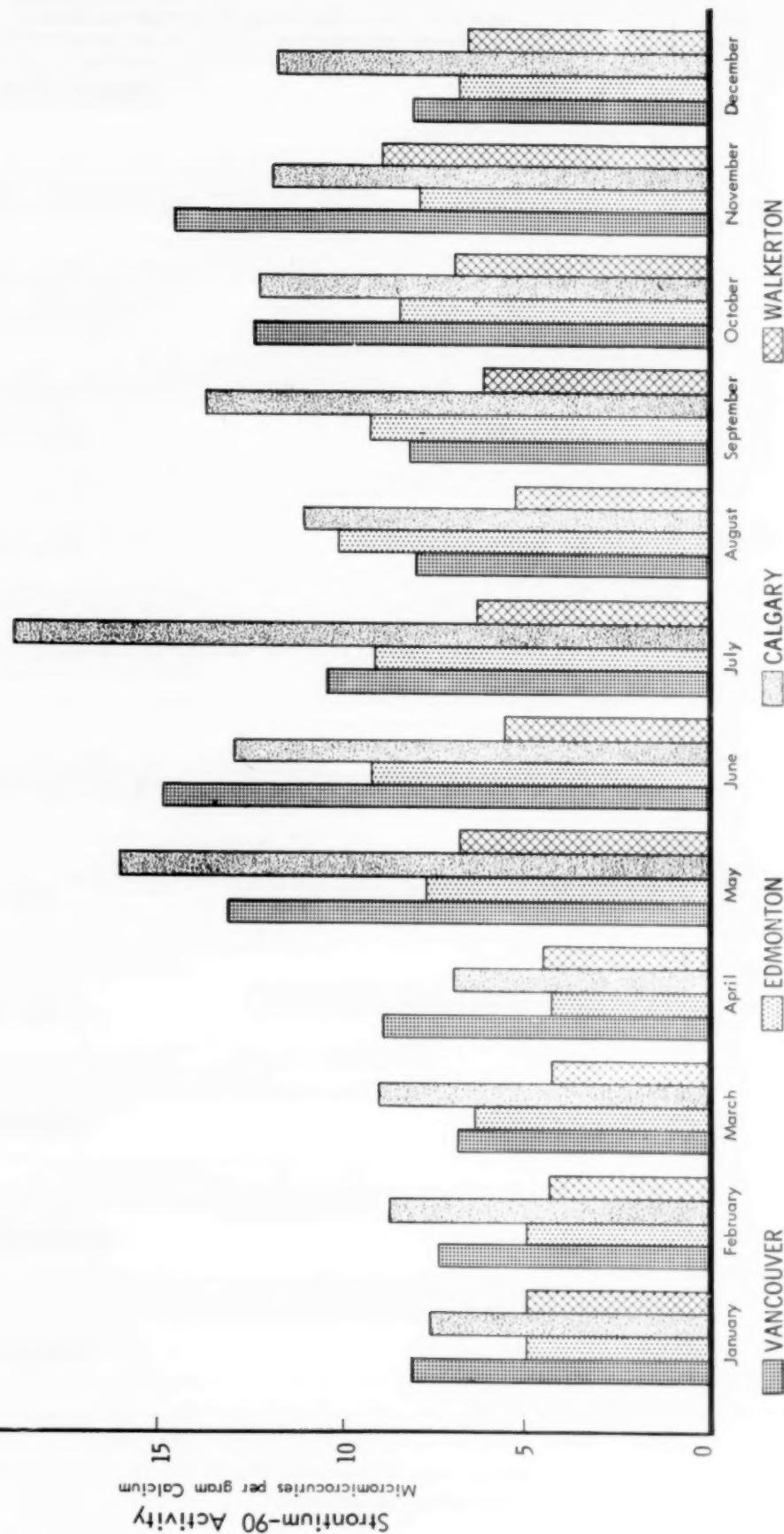


FIGURE 4a

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK SAMPLES JAN. - DEC. 1958

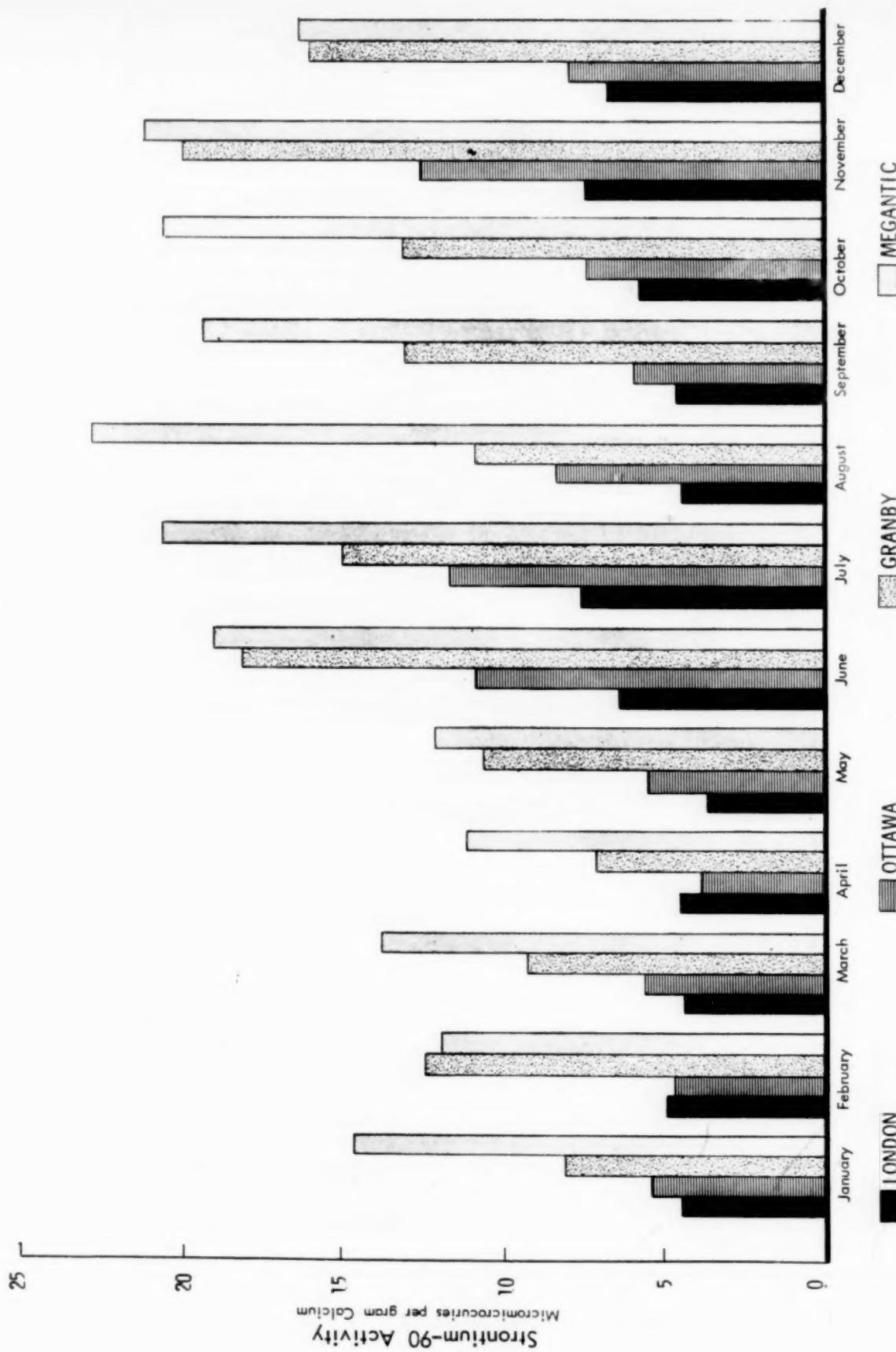
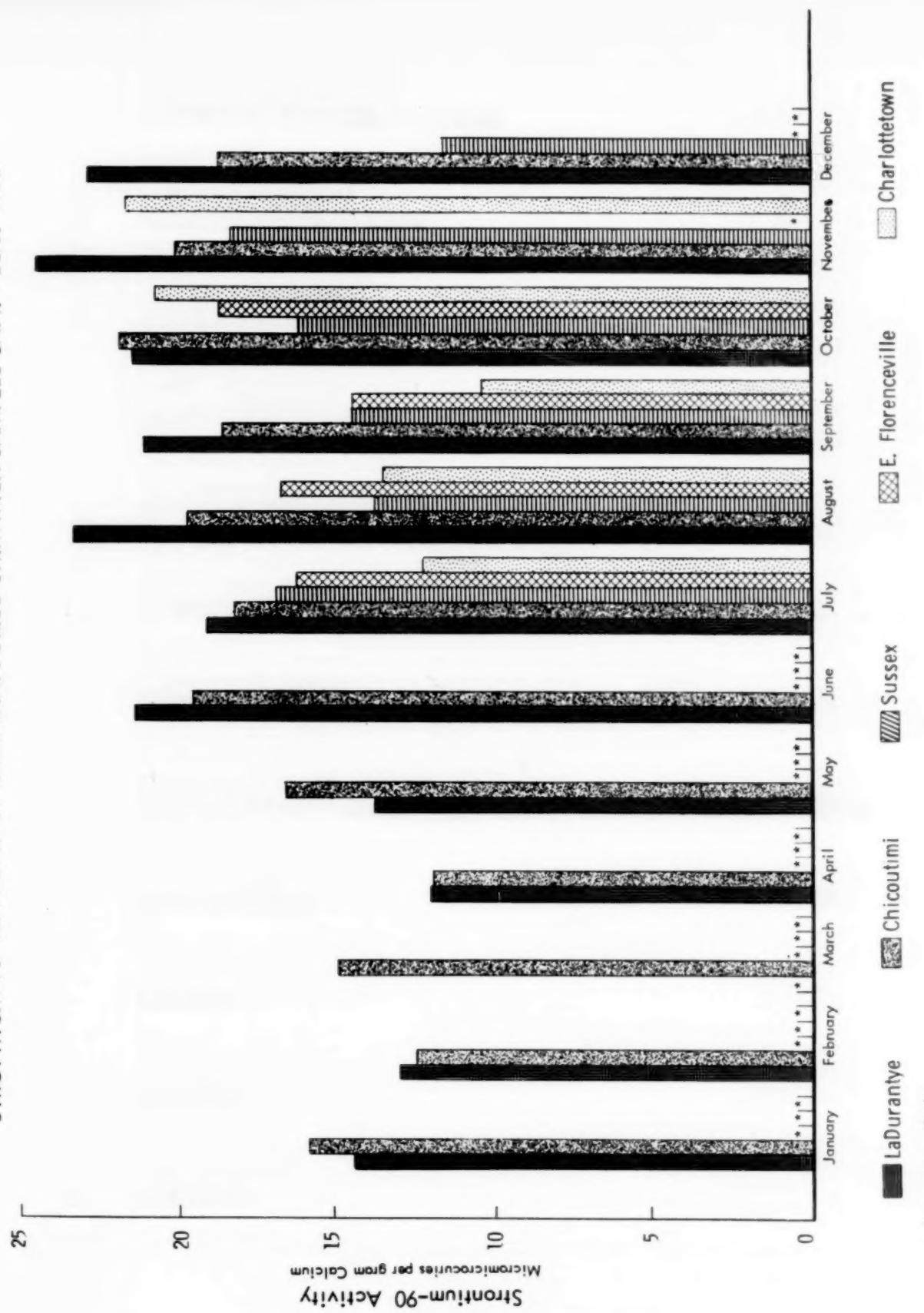


FIGURE 4b

FIGURE 4b

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK SAMPLES JAN. - DEC. 1958



STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK POWDER SAMPLES JAN. - DEC. 1959

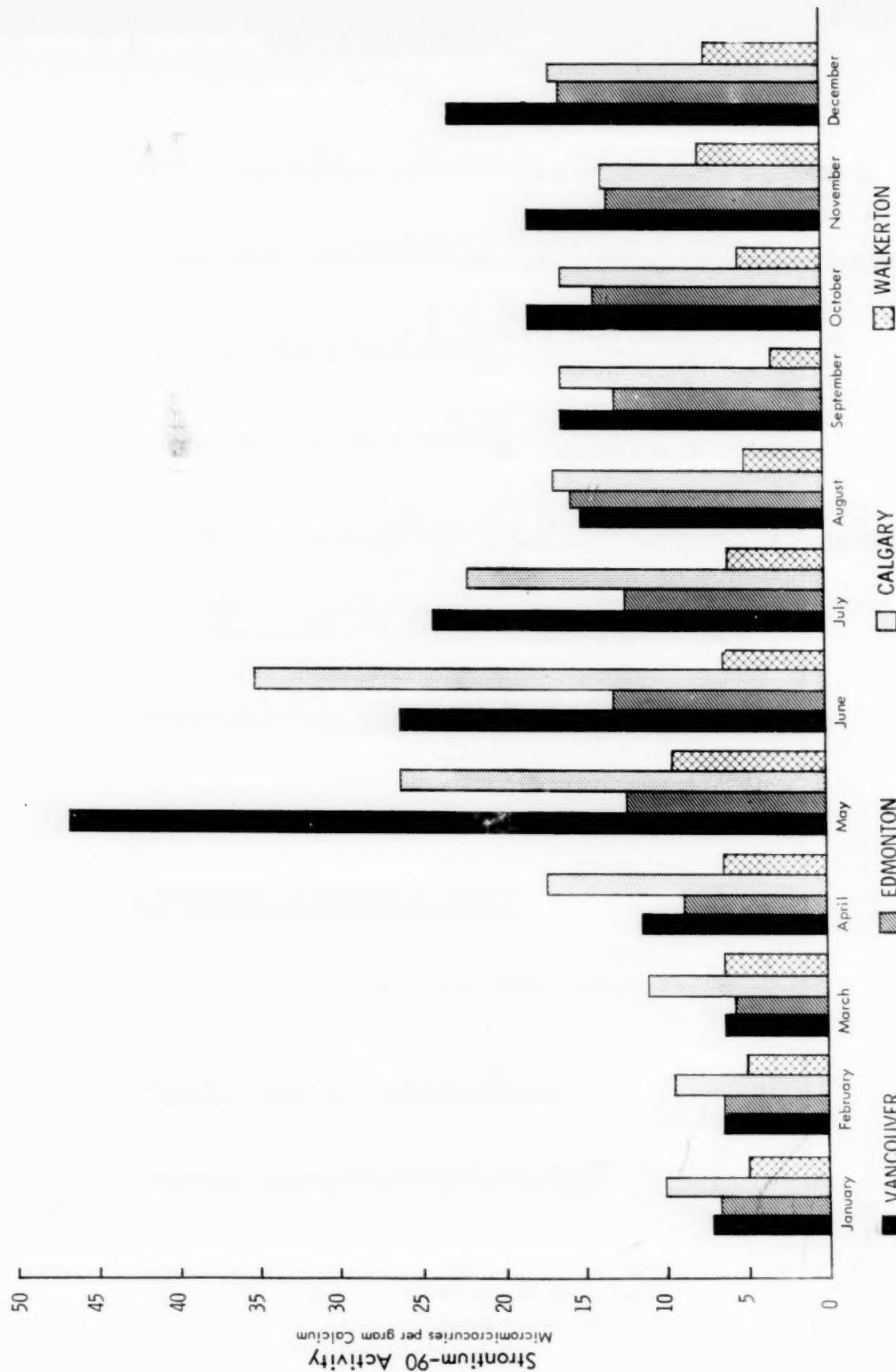


FIGURE 5a

FIGURE 5a

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK POWDER SAMPLES JAN.-DEC. 1959

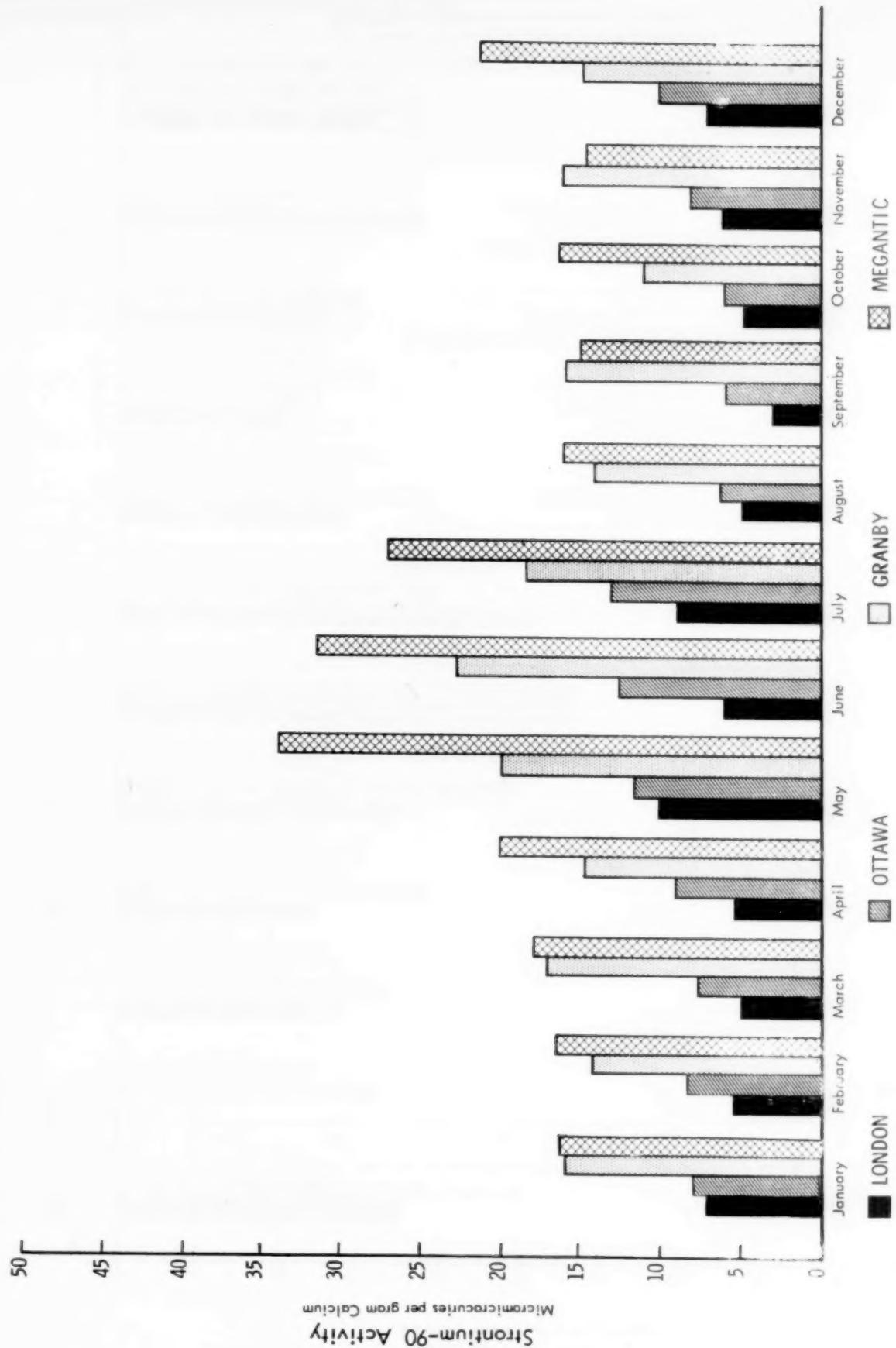
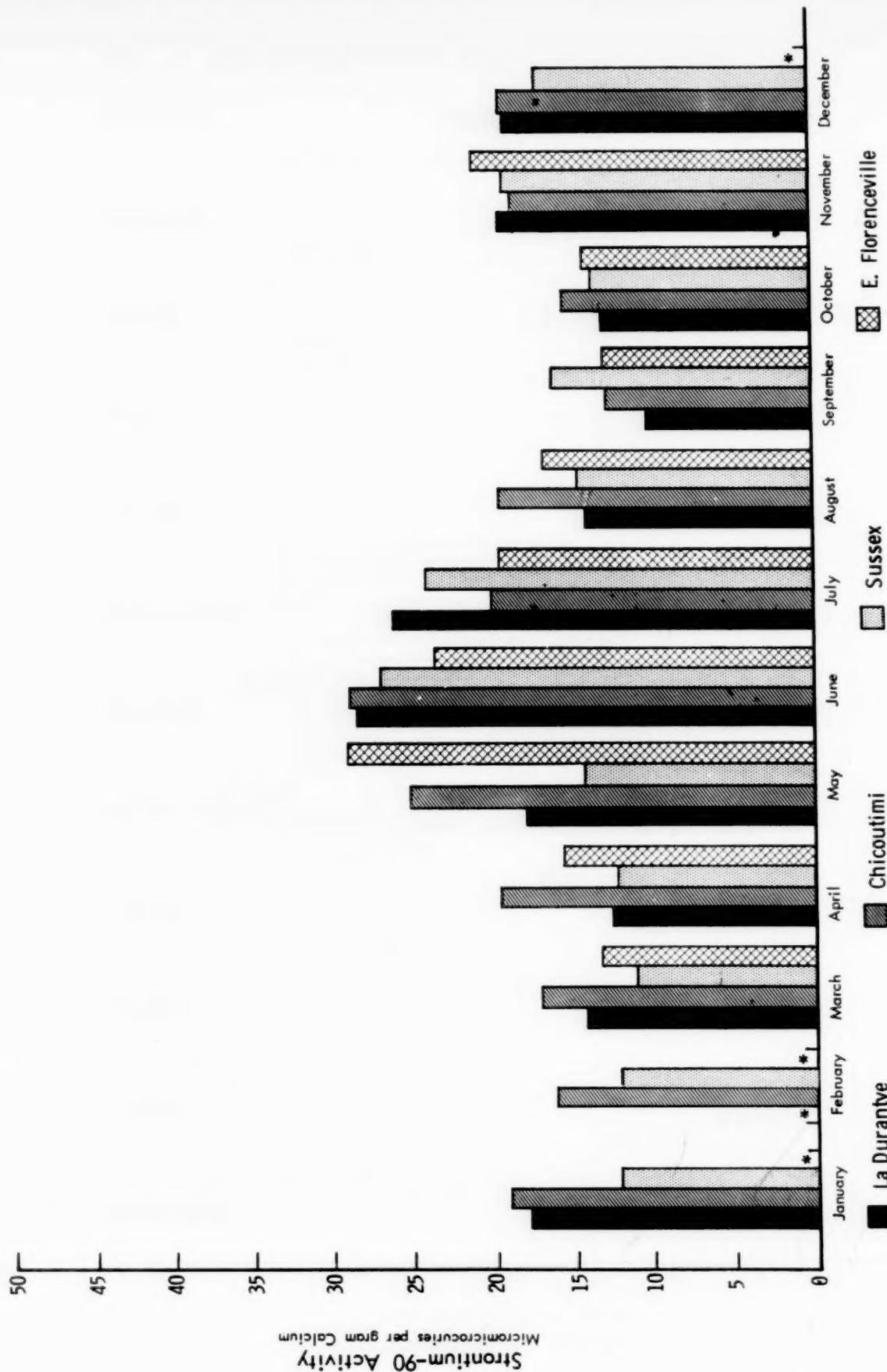


FIGURE 5b

* Data not available.

STRONTIUM-90 CONTENT OF CANADIAN DRIED SKIM MILK POWDER SAMPLES JAN. - DEC. 1959



* Data not available.

FIGURE 5c

FIGURE 5c

STRONTIUM-90 CONTENT OF CANADIAN DRIED BUTTERMILK SAMPLES JAN. - DEC. 1957

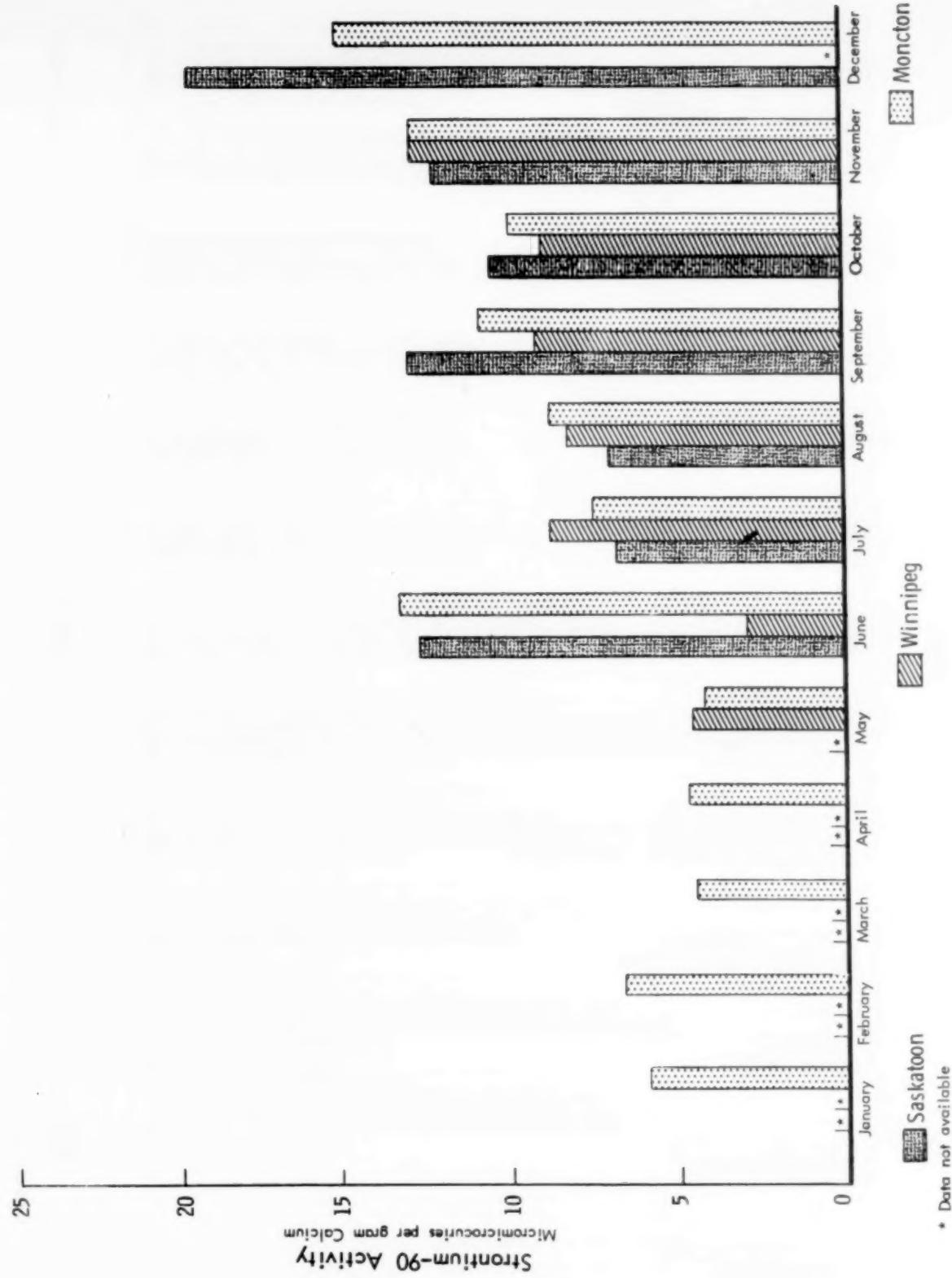


FIGURE 6

STRONTIUM-90 CONTENT OF CANADIAN DRIED BUTTERMILK SAMPLES JAN. - DEC. 1958

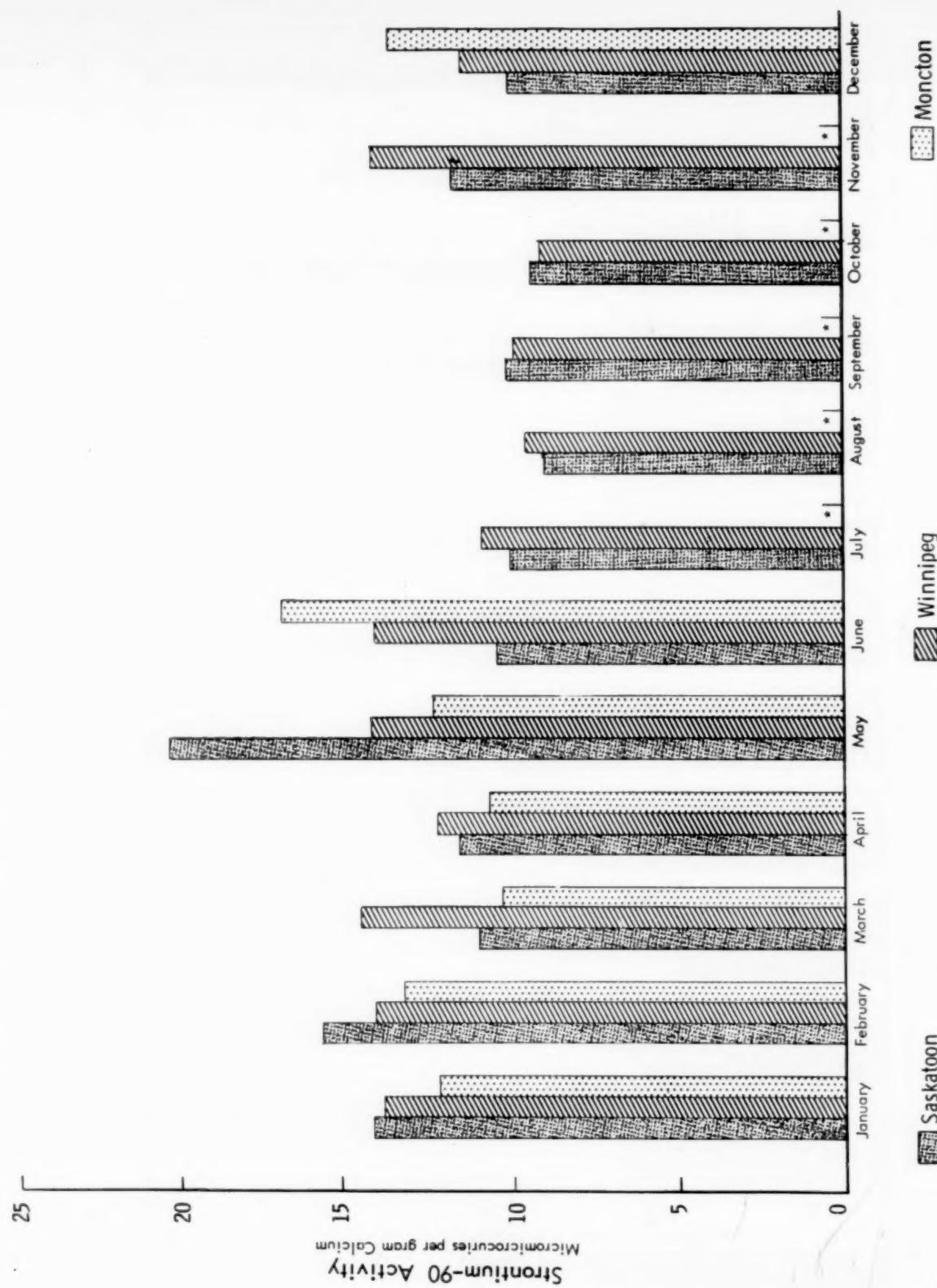
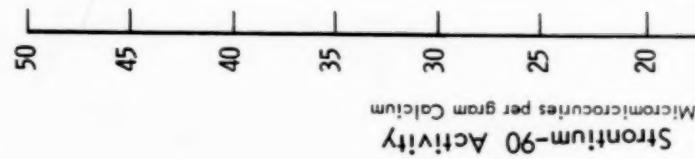


FIGURE 7

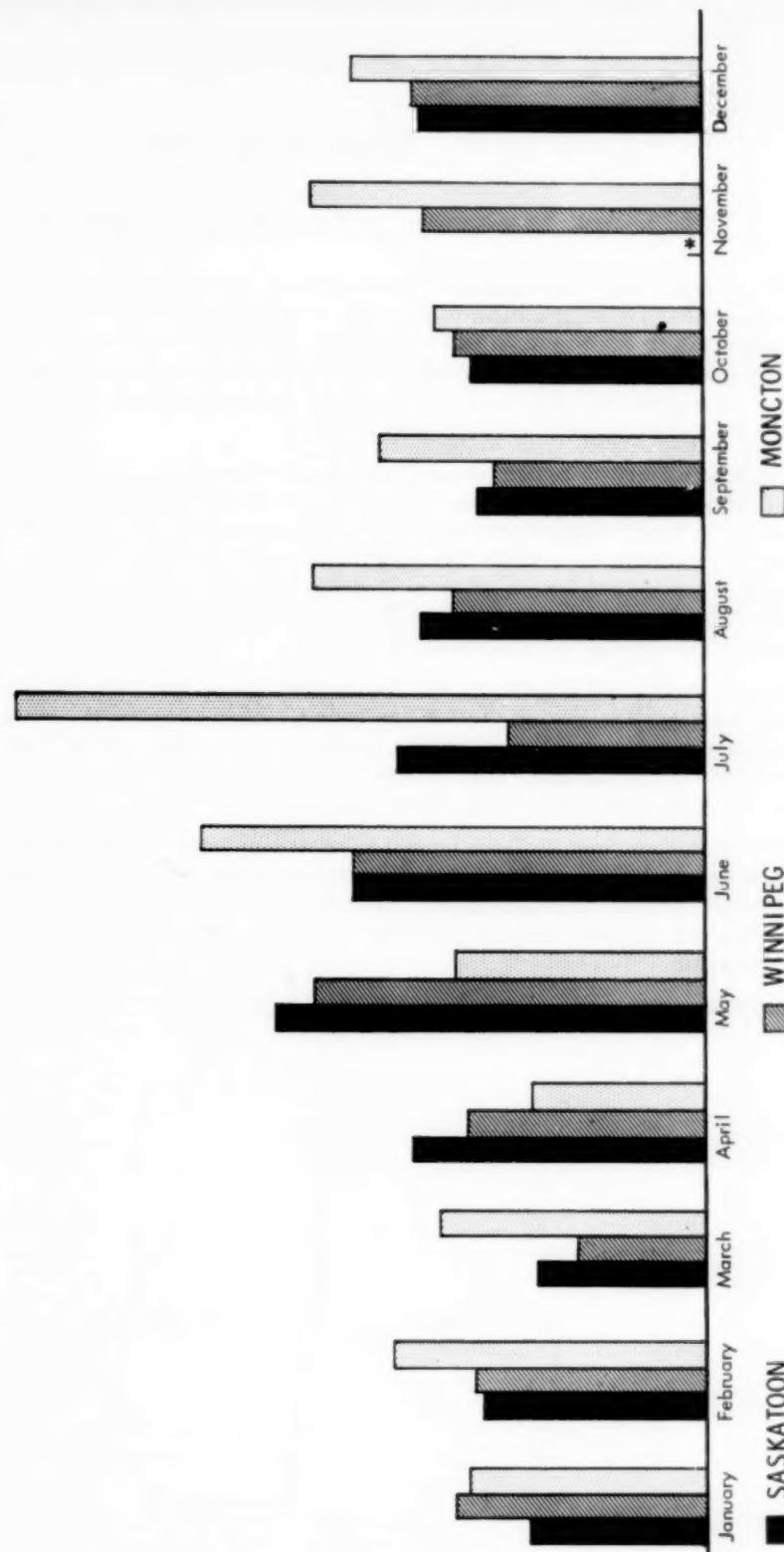
FIGURE 7

STRONTIUM-90 CONTENT OF CANADIAN DRIED BUTTERMILK POWDER SAMPLES JAN. - DEC. 1959



* Data not available.

FIGURE 8



SECTION II.—AIR

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

The Public Health Service Radiation Surveillance Network was established in 1956 in cooperation with the Atomic Energy Commission to provide a means of promptly determining increases in environmental radiation due to radioactive fallout during nuclear weapons tests. The program has proven sufficiently valuable that it has been extended to a round-the-year basis and currently consists of 45 stations at urban locations (see figure 1) operated by State and local health department personnel with 2 operated by U. S. Public Health Service personnel.

Measurements of gross beta radioactivity in air have been taken since they provide one of the earliest and most sensitive indications of increases of activity in the environment, and thus act as an "alert" system. A direct evaluation of biological hazards is not possible from these data alone. However, field measurements do enable the operator to estimate the amount of beta activity of particulates in the air at the station five hours after collection, by comparison to a known source, using a portable survey meter. The filters are then forwarded to a laboratory in Washington for a more refined measurement using a thin window proportional counter.

Air samplers are in operation at the 45 stations on an average of 70% of the week. Air is drawn through a cellulose carbon loaded dust filter using a high volume air sampler. The radioactive material in fallout adhering to small dust-like particles is retained on the filter. Some gaseous fission products are adsorbed by the carbon. The contribution by gaseous fission products has represented only a small part of the total beta activity in these samples.

About 85% of the stations collect samples of precipitation which are sent to Washington for analysis. Values are now below limits of detection by present instrumentation. New equipment is being procured to measure lower values. Measurements have indicated that the bulk of deposited activity occurs through precipitation but concentrations in surface air are not directly relatable to the amount deposited through precipitation.

Table VI presents a summary of the latest monthly data.

PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

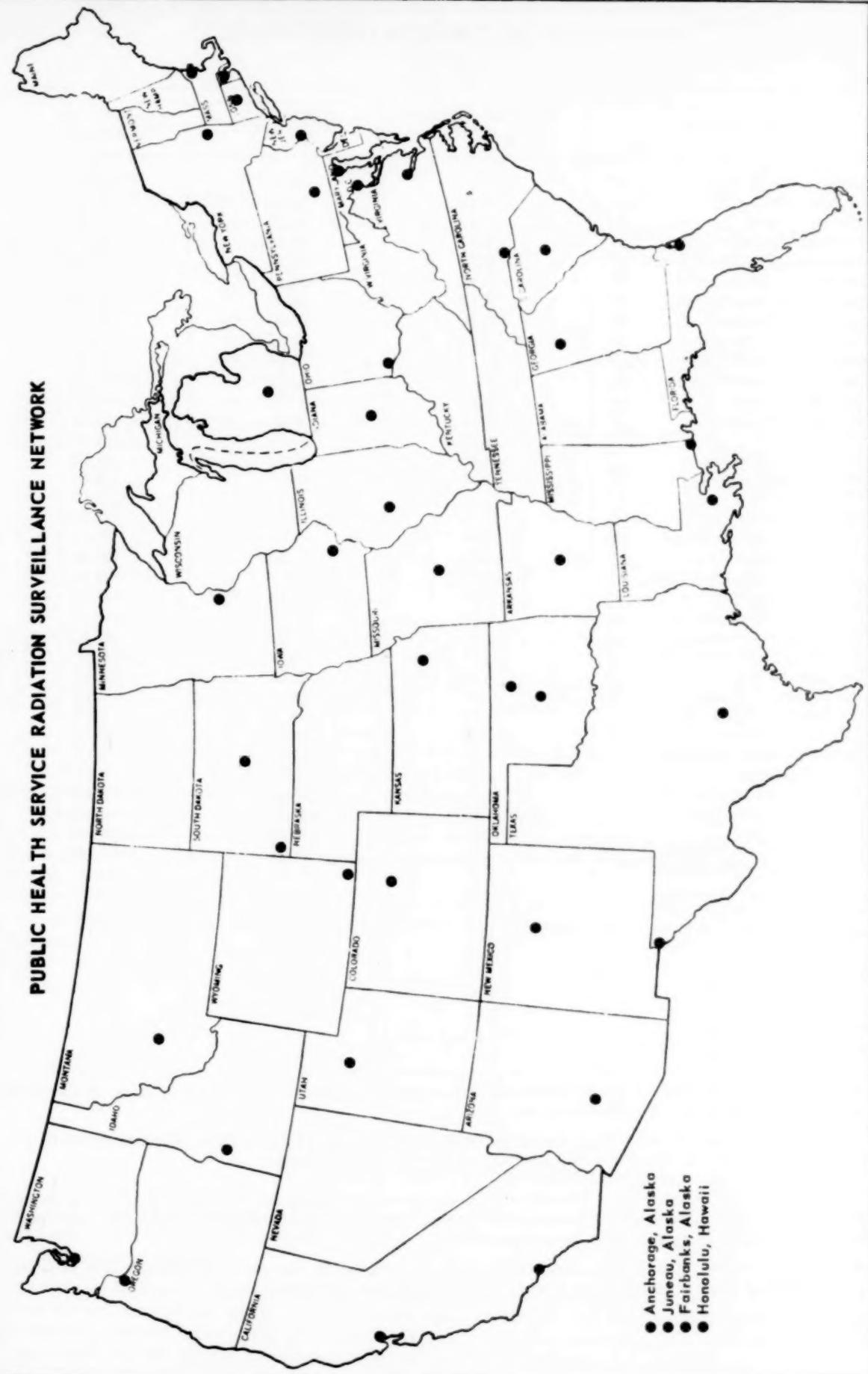


FIGURE 9

TABLE VI.--RADIOACTIVITY OF PARTICULATES IN AIR--GROSS BETA COUNTS

Public Health Service Radiation Surveillance Network

April 1960

Station location	Weighted averages $\mu\text{c}/\text{M}^3$	Maximum $\mu\text{c}/\text{M}^3$	Minimum $\mu\text{c}/\text{M}^3$
Alaska, Anchorage	< 0.14	0.24	< 0.10
Alaska, Fairbanks	< 0.14	0.19	< 0.10
Alaska, Juneau	< 0.13	0.30	< 0.10
Arizona, Phoenix	0.31	0.40	0.19
Arkansas, Little Rock	0.21	0.32	0.13
California, Berkeley	< 0.12	0.21	< 0.10
California, Los Angeles	< 0.18	0.39	< 0.10
Colorado, Denver	< 0.26	0.56	< 0.10
Connecticut, Hartford	< 0.15	0.32	< 0.10
District of Columbia	< 0.23	0.44	< 0.10
Florida, Jacksonville	< 0.19	0.31	< 0.10
Georgia, Atlanta	< 0.23	0.32	< 0.10
Hawaii, Honolulu	< 0.14	0.25	< 0.10
Idaho, Boise	0.28	0.41	0.20
Illinois, Springfield	< 0.25	0.45	< 0.10
Indiana, Indianapolis	< 0.19	0.39	< 0.10
Iowa, Iowa City	< 0.16	0.28	< 0.10
Kansas, Topeka	< 0.20	0.50	< 0.10
Louisiana, New Orleans	0.21	0.27	0.12
Maryland, Baltimore	< 0.20	0.35	< 0.10
Massachusetts, Lawrence	< 0.12	0.17	< 0.10
Michigan, Lansing	< 0.18	0.43	< 0.10
Minnesota, Minneapolis	< 0.16	0.21	< 0.10
Mississippi, Pascagoula	0.22	0.51	0.14
Missouri, Jefferson City	< 0.19	0.36	< 0.10
Montana, Helena	< 0.15	0.25	< 0.10
New Jersey, Trenton	< 0.16	0.30	< 0.10
New Mexico, Santa Fe	0.33	0.57	0.18
New York, Albany	< 0.15	0.33	< 0.10
North Carolina, Gastonia	< 0.26	0.39	< 0.10
Ohio, Cincinnati	1.12	3.30	0.20
Oklahoma, Oklahoma City	0.26	0.49	0.13
Oklahoma, Ponca City	< 0.11	0.23	< 0.10
Oregon, Portland	< 0.16	0.35	< 0.10
Pennsylvania, Harrisburg	< 0.25	0.46	< 0.10
Rhode Island, Providence	< 0.16	0.34	< 0.10
South Carolina, Columbia	< 0.20	0.39	< 0.10
South Dakota, Edgemont	0.32	0.53	0.14
South Dakota, Pierre	< 0.23	0.37	< 0.10
Texas, Austin	< 0.18	0.33	< 0.10
Texas, El Paso	0.31	0.50	0.14
Utah, Salt Lake City	< 0.20	0.34	< 0.10
Virginia, Richmond	< 0.16	0.25	< 0.10
Washington, Seattle	< 0.10	0.13	< 0.10
Wyoming, Cheyenne	0.21	0.29	0.13

Values for beta activities in air in Cincinnati are somewhat higher than in other stations in the Radiation Surveillance Network. Reasons may be:

1. Cincinnati uses a membrane type filter with a 20 liters per minute flow rate, compared to a cellulose type filter at other stations sampling 1,500 liters per minute.
2. Variations in counting equipment.
3. Samples are counted at Cincinnati within one day after collection, whereas the samples from other stations are counted several days later in Washington. Thus, Cincinnati values may incorporate natural beta activity from thoron daughters.

Although the relative contribution from each of these parameters has yet to be evaluated, it is recognized that some of them probably play a much more significant role than others.

TABLE VII.—RADON AND THORON AIR MEASUREMENTS

Public Health Service Radiation Surveillance Network
Cincinnati, Ohio

April 1960

Date	Continuous sample collection			Radon ^(a) AM μc/M ³	Radon ^(b) PM μc/M ³	Thoron ^(c) μc/M ³	Beta ^(d) activity μc/M ³
	Sample change time	Sampling period (hours)	Volume M ³				
April 1 4 5 6 7 8 11 12 13 14 15 18 19 20 21 22 25 26 27 28 29	0806	23.9	27.5	123	82	1.8	0.4 (3)
	0819	72.1	83.9	127	62	1.9	0.3
	0812	23.9	28.0	51	46	0.9	0.5
	0810	23.9	28.0	150	60	2.0	0.9
	0810	23.8	27.4	237	47	2.2	0.9
	0830	24.3	28.4	96	40	2.1	0.3 (3)
	0808	71.5	84.5	262	89	4.5	0.6
	0815	24.0	25.2	204	26	3.2	1.0
	0815	23.9	27.0	746	75	9.4	3.3
	0803	23.7	27.4	201	59	3.4	1.3
	0808	24.0	27.6	298	66	4.8	0.3 (3)
	0810	71.9	84.1	91	42	2.5	0.6
	0803	23.8	28.0	268	36	4.9	1.6
	0810	24.0	28.4	634	80	9.0	2.9
	0807	23.9	28.0	121	57	2.9	1.6
	0810	23.9	28.1	538	97	4.6	0.2 (3)
	0812	72.0	84.2	970	84	13.7	1.8
	0805	23.8	28.0	698	77	8.2	2.9
	0810	24.0	28.4	294	107	5.4	1.7
	0806	23.9	28.4	244	93	5.3	1.6
	0812	23.9	28.1	552	141	9.1	1.3 (3)
Average.....				319	73	4.6	0.99

(a) Measured within a few minutes of removal of filter from sampler and corrected back to collection time (uncorrected for thoron daughter interference).

(b) Filters are temporarily withdrawn from sampler at about 3 PM and counted. (Values are corrected back to removal time.) The filters are then replaced on sampler to complete the sampling period of about 24 hours. Thus, the values in this column are from the same filters that are counted at about 8 a.m. the following day.

(c) Thoron from alpha activity of filter sample counted 7 hours after taking a 24-96 hour sample.

(d) Gross beta activity when counted one day after end of sampling or later as indicated by numeral in parenthesis.

DATA ON RADIOACTIVITY IN AIR

U. S. Naval Research Laboratory

Radioactivity measurements of air-filter samples collected at various sites along the 80th Meridian (West) are made by the U. S. Naval Research Laboratory under a program partially financed by the Atomic Energy Commission.

The daily record of fission product beta activity during May 1960 is shown in Table VIII, while the radioactivity profile for the same month is shown in Figure 10. All radioactivity concentrations are given in disintegrations per minute per cubic meter of air at the collecting site (2.2 disintegrations per minute per cubic meter equals 1 micromicrocurie per cubic meter).

TABLE VIII.—DAILY RECORD OF FISSION PRODUCT β -ACTIVITY
COLLECTED BY AIR FILTRATION

May 1960

(Disintegrations/minute per cubic meter of air)

Day	Punta Arenas, Chile	Puerto Montt, Chile	Santiago, Chile	Antofa-gasta, Chile	Chacaltaya, Bolivia	Lima, Peru	Guayaquil, Ecuador
1	0.01	0.07	0.14	0.08	0.04	0.01	0.07
2	0.01	0.07	0.14	0.08	0.04	0.01	0.07
3	0.01	0.06	0.08	0.06	0.02	0.01	0.05
4	0.01	0.06	0.08	0.06	0.02	0.01	0.05
5	0.09	0.03	0.08	0.08	0.02	0.02	0.07
6	0.09	0.03	0.08	0.08	0.02	0.02	0.07
7	-	0.05	0.11	0.05	0.04	0.01	0.07
8	-	0.05	0.11	0.05	0.04	0.01	0.07
9	0.07	0.05	0.07	0.05	0.04	0.01	0.07
10	0.07	0.10	0.07	0.08	0.05	0.01	0.07
11	0.07	0.10	0.07	0.08	0.05	0.01	0.07
12	-	0.08	0.09	0.07	0.02	0.05	0.05
13	-	0.08	0.09	0.07	0.02	0.05	0.07
14	-	0.05	0.07	0.07	0.08	0.01	0.12
15	-	0.05	0.07	0.07	0.08	0.01	0.07
16	0.07	0.05	0.07	0.07	0.08	0.01	0.07
17	0.07	0.05	0.06	0.10	0.20	0.03	0.07
18	0.07	0.05	0.06	0.10	0.20	0.03	0.07
19	0.02	0.04	0.05	-	0.04	0.02	0.07
20	0.02	0.04	0.05	-	0.04	0.02	0.07
21	-	0.03	0.09	-	0.02	0.01	0.09
22	-	0.03	0.09	-	0.02	0.01	0.07
23	-	0.03	0.09	-	0.02	0.01	0.14
24	-	-	0.06	-	0.04	0.01	0.04
25	-	-	0.06	-	0.04	0.01	0.04
26	-	-	0.07	-	0.04	0.02	0.07
27	-	-	0.07	-	0.04	0.02	0.07
28	-	-	0.14	-	0.04	0.02	0.07
29	-	-	0.14	-	0.04	0.02	0.07
30	-	-	-	-	0.04	0.02	0.05
31	-	-	-	-	0.05	0.05	0.09
Mean value	0.05	0.05	0.08	0.07	0.05	0.02	0.07

TABLE VIII.—DAILY RECORD OF FISSION PRODUCT β -ACTIVITY
COLLECTED BY AIR FILTRATION—Con.

May 1960

(Disintegrations/minute per cubic meter of air)

Day	Miraflores, Panama Canal	Mauna Loa, Hawaii	Miami, Florida	Washing- ton, D.C.	Moosonee, Ontario, Canada	Thule, Green- land	Bravo, Arctic Ice Floe*
1	0.08	0.01	0.60	0.58	0.41	0.31	-
2	0.08	0.01	0.60	0.58	0.22	0.31	-
3	0.06	0.40	0.35	0.59	0.22	0.31	-
4	0.06	0.40	0.35	0.59	0.74	0.31	-
5	0.11	0.40	0.21	0.58	0.39	0.26	-
6	0.11	0.40	0.21	0.58	0.22	0.26	-
7	0.06	0.48	0.43	0.32	0.22	0.26	-
8	0.06	0.48	0.43	0.32	0.25	0.27	-
9	0.06	0.48	0.43	0.32	0.46	0.27	-
10	0.08	0.10	1.00	0.31	0.35	0.32	-
11	0.08	0.10	1.00	0.31	0.32	0.32	-
12	0.06	0.05	1.01	0.06	0.53	0.32	-
13	0.06	0.05	1.01	0.06	0.12	0.18	-
14	0.06	0.11	0.79	0.33	0.12	0.18	-
15	0.06	0.11	0.79	0.33	0.12	0.17	-
16	0.06	0.11	0.79	0.33	0.12	0.17	-
17	0.06	0.17	0.87	1.54	0.55	0.24	-
18	0.06	0.17	0.87	1.54	0.55	0.24	-
19	0.10	0.51	0.90	-	0.12	0.14	-
20	0.10	0.51	0.90	-	0.12	0.14	-
21	0.03	0.21	0.28	0.37	0.21	0.14	-
22	0.03	0.21	0.28	0.37	0.21	0.15	-
23	0.03	0.21	0.28	0.37	0.21	0.15	-
24	0.06	0.13	0.55	0.54	0.10	0.12	-
25	0.06	0.13	0.55	0.54	0.10	0.12	-
26	0.02	0.19	0.24	0.64	0.38	0.11	-
27	0.02	0.19	0.24	0.64	0.38	0.11	-
28	0.03	0.20	0.13	0.33	0.36	0.22	-
29	0.03	0.20	0.13	0.33	0.36	0.22	-
30	0.03	0.20	0.13	0.33	0.36	0.22	-
31	0.04	0.36	0.14	0.50	0.25	0.28	-
Mean value	0.06	0.23	0.53	0.49	0.29	0.22	-

* Arctic Ice Floe Station "Bravo"—no samples received.

AVERAGE MEASUREMENTS OF SURFACE AIR AT STATIONS ALONG 80th MERIDIAN

U. S. Naval Research Laboratory

May 1960

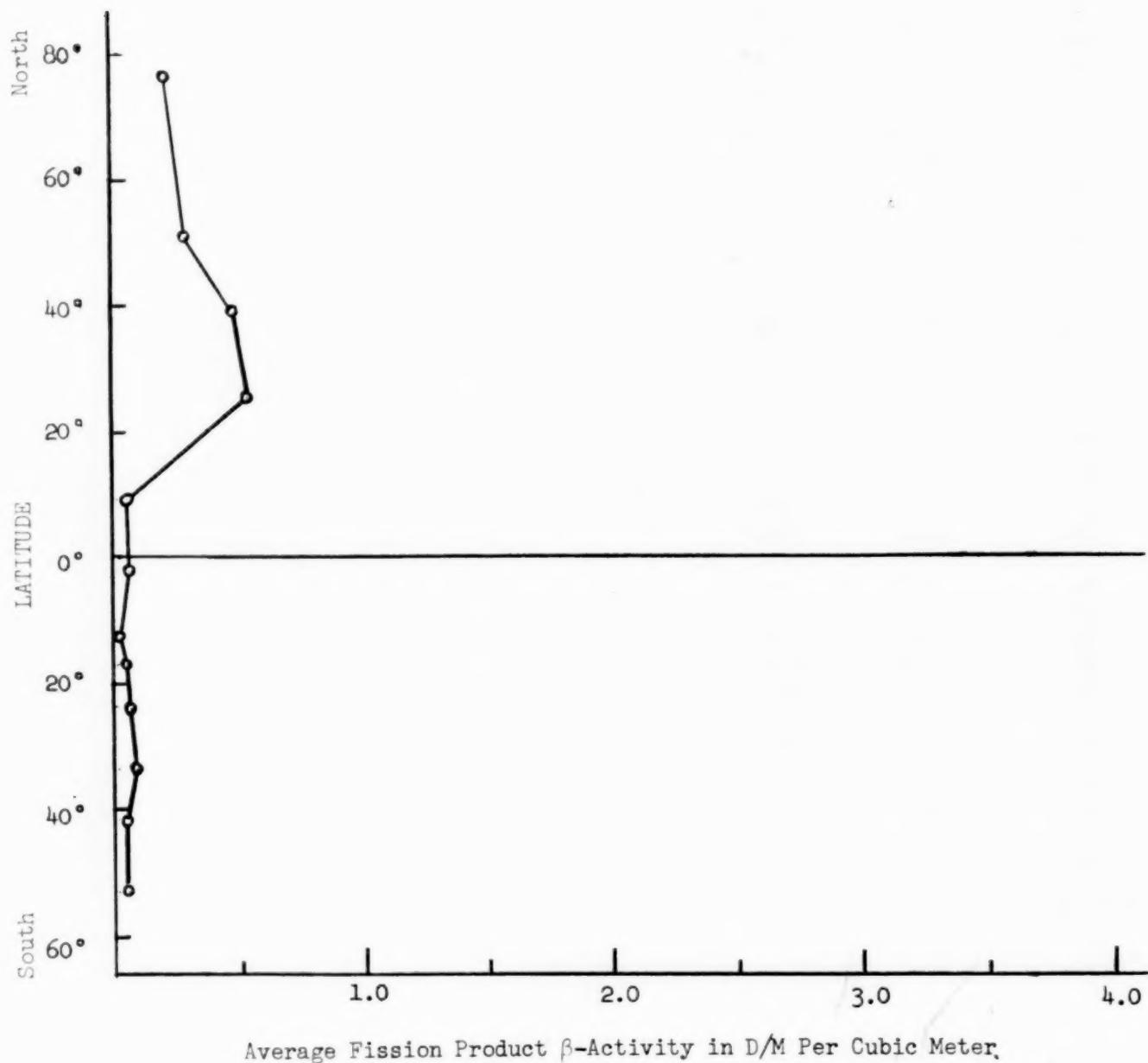


FIGURE 10

SECTION III.—WATER

PUBLIC HEALTH SERVICE NATIONAL WATER QUALITY NETWORK

The National Water Quality Network was established under the provisions of Section 4(c) of Public Law 660, which states that ". . . the Surgeon General shall . . . collect and disseminate basic data . . . (relating) to water pollution and the prevention and control thereof."

This Network, operated in cooperation with State and local health agencies, was started in October 1957. At present there are 75 sampling stations located on major waterways used for public water supply, propagation of fish and wildlife, recreational purposes, and for agricultural, industrial and other uses; some of these stations are interstate, coastal, and International Boundary waters, and waters on which activities of the Federal Government may have an impact. Ultimately a total of 250 to 300 stations will be operated. A few of the more recently established stations have not yet begun to report radioactivity.

Samples of water are examined for chemical, physical, and biological quality insofar as these relate to pollution. Samples for some determinations are taken weekly, others monthly, and for some continuous composite samples of 10 to 15 days are obtained. Radioactivity determinations are made on single samples, taken weekly.

Gross alpha and beta measurements are made on both suspended and dissolved solids in the raw surface water samples. The radioactivity levels of dissolved solids provide a rough measure of the levels which may be found in a treated water, where such water treatment removes substantially all of the suspended matter. Naturally occurring radioactive substances in the environment are the source of essentially all of the alpha activity. The contamination of the environment from man-made sources is the major contributor to the beta activity. It should be noted that with the cessation of weapons testing, beta activity in most raw waters is generally approaching a level attributed to only natural beta activity. Natural beta activity can be two or three times the natural alpha activity based on the same nuclides being present. Some exceptions to this are seen, notably the data for the Columbia River and the Animas River. The results are reported in micromicrocuries per liter, and are shown for each station on a given river.

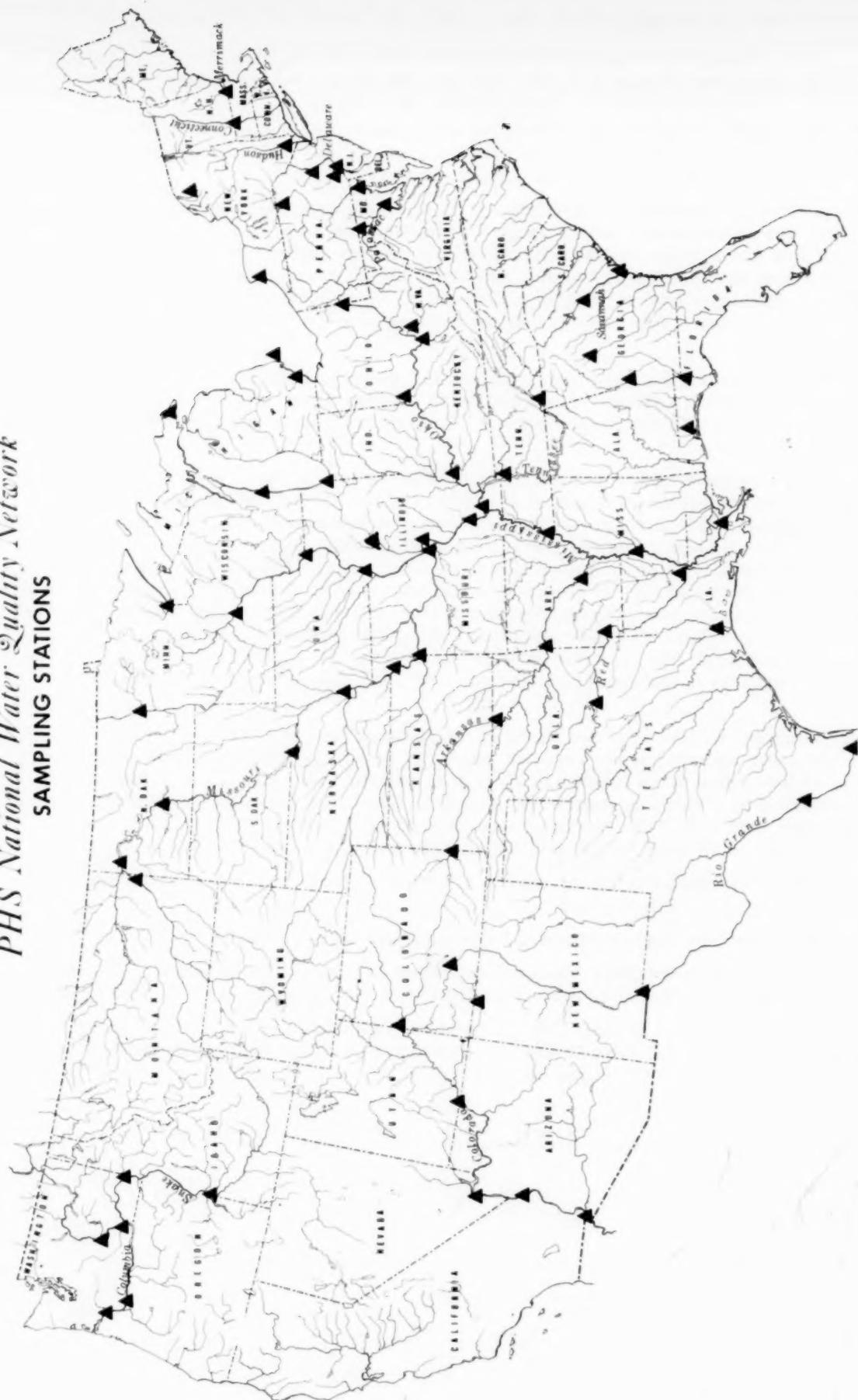
While beta determinations for the first two years of the Network operation have been done on each sample weekly, the alpha determinations are reported generally on a composite sample of more than one week. Beginning with samples taken in January 1960, beta determinations are to be performed on composite samples obtained by combining two weekly samples. The alpha data will be reported on three-month composite samples, with 1/3 of the stations being covered each month. All the data reported below represent the average of all information available for the month indicated.

Strontium-90 data are reported as being the results of determinations on composite sample for a three-month period ending in the month shown.

Additional information and data may be obtained from the following sources:

1. "National Water Quality Network Annual Compilation of Data," PHS Publication. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$1.50.
2. "Report on National Water Quality Control Network," submitted by Dr. F. J. Weber, Chief, Division of Radiological Health, PHS, to Joint Committee on Atomic Energy Hearings on Fallout from Nuclear Weapons Tests, Vol. 1, May 1959, Pages 167-169.

PHS National Water Quality Network
SAMPLING STATIONS



As of June 30, 1960

FIGURE 11

TABLE IX.—RADIOACTIVITY IN RAW SURFACE WATERS
 Public Health Service National Water Quality Network
 (Micromicrocuries per liter)

Station	Quarter ending 3/31/60	Month of March 1960					
		Beta activity			Alpha activity		
	Strontium-90	Susp.	Diss.	Total	Susp.	Diss.	Total
ALSEA RIVER Alsea, Oreg.	0.1	0	0	0	0	0	0
ANIMAS RIVER Cedar Hill, N. Mex.	0.5	374	6	380	150	6	156
ARKANSAS RIVER Coolidge, Kans.	1.2	0	0	0	0	56	56
Ponca City, Okla.	0.9	54	28	82	1	0	1
Pendleton Ferry, Ark.	0.8	0	0	0	3	2	5
CHATTAHOOCHEE RIVER Columbus, Ga.	0.5	<1	2	2	0	0	0
COLORADO RIVER Loma, Colo.	0.1	86	71	157	17	14	31
Page, Ariz.	0.2	4	6	10	14	12	26
Hoover Dam, Ariz.-Nev.	0.7	0	0	0	0	8	8
Parker Dam, Ariz.-Calif.	0.3	4	5	9	0	6	6
Yuma, Ariz.	0.3	3	0	3	0	6	6
COLUMBIA RIVER Wenatchee, Wash.	0.4	0	0	0	0	0	0
Pasco, Wash.	0.6	58	523	581	0	0	0
Bonneville Dam, Oreg.	0.3	35	246	281	<1	1	2
Clatskanie, Oreg.	0.1	18	107	125	<1	<1	1
CONNECTICUT RIVER Northfield, Mass.		5	1	6	-	-	-
DELAWARE RIVER Martin's Creek, Pa.	0.6	0	<1	<1	0	0	0
Philadelphia, Pa.	0.9	0	3	3	0	0	0
GREAT LAKES Gary, Ind.	0.5	0	0	0	-	-	-
Duluth, Minn.	0.2	0	1	1	0	0	0
Detroit, Mich.	0.3	0	3	3	0	0	0
Buffalo, N. Y.	0.9	0	1	1	0	1	1
HUDSON RIVER Poughkeepsie, N. Y.	1.7	0	0	0	0	1	1
ILLINOIS RIVER Peoria, Ill.	-	0	0	0	1	3	4
KANAWHA RIVER Winfield Dam, W. Va.	0.2	4	2	6	2	<1	2
MERRIMACK RIVER Lowell, Mass.	0.5	-	-	-	-	-	-
MISSISSIPPI RIVER Red Wing, Minn.	0.7	0	4	4	0	0	0
Dubuque, Iowa	1.4	0	0	0	0	0	0
Burlington, Iowa	1.0	0	0	0	0	1	1
East St. Louis, Ill.	0.5	0	0	0	0	0	0

TABLE IX.—RADIOACTIVITY IN RAW SURFACE WATERS—Con.

Public Health Service National Water Quality Network

(Micromicrocuries per liter)

Station	Quarter ending 3/31/60	Month of March 1960					
		Beta activity			Alpha activity		
	Strontium-90	Susp.	Diss.	Total	Susp.	Diss.	Total
MISSISSIPPI RIVER--Con.							
Cape Girardeau, Mo.	0.4	0	0	0	1	2	3
W. Memphis, Ark.	1.3	5	5	10	2	1	3
Delta, La.	1.0	9	7	16	2	1	3
New Orleans, La.	0.9	10	18	28	3	0	3
MISSOURI RIVER							
Bismarck, N. Dak.	0.5	6	13	19	0	4	4
Yankton, S. Dak.	1.7	3	4	7	0	2	2
Omaha, Nebr.	0.4	0	6	6	0	3	3
St. Joseph, Mo.	0.9	48	5	53	41	4	45
Kansas City, Kans.	0.5	22	<1	22	15	3	18
St. Louis, Mo.	0.9	10	5	15	0	1	1
OHIO RIVER							
East Liverpool, Ohio	0.5	0	2	2	0	1	1
Huntington, W. Va.	0.2	0	2	2	1	0	1
Cincinnati, Ohio	0.4	4	0	4	3	0	3
Evansville, Ind.	0.7	-	-	-	-	-	-
Cairo, Ill.	0.6	2	3	5	2	0	2
POTOMAC RIVER							
Williamsport, Md.	0.3	0	0	0	0	0	0
Great Falls, Md.	0.6	34	1	35	0	0	0
RED RIVER							
Denison, Tex.	1.4	0	1	1	0	0	0
Index, Ark.	0.7	<1	6	6	3	2	5
Alexandria, La.	1.3	0	3	3	-	-	-
RIO GRANDE RIVER							
Laredo, Tex.	0.1	3	1	4	0	5	5
Brownsville, Tex.	0.6	0	0	0	-	-	-
ST. MARY'S RIVER							
Sault Ste. Marie, Mich.	0.3	0	5	5	0	0	0
SCHUYLKILL RIVER							
Philadelphia, Pa.	0.5	0	0	0	0	0	0
SAVANNAH RIVER							
Port Wentworth, Ga.	0.2	2	4	6	0	0	0
SNAKE RIVER							
Wawawai, Wash.	0.3	0	<1	<1	1	0	1
Weiser, Idaho	-	0	0	0	1	1	2
SUSQUEHANNA RIVER							
Sayre, Pa.	-	0	0	0	0	0	0
TENNESSEE RIVER							
Chattanooga, Tenn.	0.4	4	70	74	0	0	0
YELLOWSTONE RIVER							
Sidney, Mont.	1.2	20	0	20	17	4	21

MONITORING OF WATER SUPPLIES AROUND THE NEVADA TEST SITE

By contract with the Atomic Energy Commission the Public Health Service has conducted an off-site monitoring program around the Nevada Test Site since 1955. Included in the program have been measurements of radioactivity in water supplies. These data have been reported in the Atomic Energy Commission's 13th, 14th, 18th and 23rd Semiannual Reports to Congress and by the Public Health Service in the 1957 Congressional Hearings, "The Nature of Radioactive Fallout and Its Effects on Man."

The following maps summarize the data on radioactivity (gross beta) in water supplies for the months of January-February 1960 and March-April 1960. The lower limit of detectability with the equipment used is about 10^{-8} microcuries per milliliter (10 micromicrocuries per liter).

TABLE X.—DESCRIPTION OF WATER SAMPLING POINTS
Nevada Test Site

Location	Source	Population served
Las Vegas	13 wells—650 to 1,250' depth plus Lake Mead supply.	40,000
Game Preserve	400' drilled well	20
Indian Springs	600' drilled well	Average 250
Pahrump	75' driven well	10-50
Ash Meadows	Spring 25' deep	8
Lathrop Wells	3 wells—600' deep	Average 15
Beatty	Spring	550
Lida Junction	125' drilled well	2-10
Goldfield	Spring	Average 200
Tonapah	2 drilled wells—60' depth	Average 1,500
Warm Springs	Multiple springs—no improvement	10
Diablo	Well	State Highway Station
Lincoln Mine	2 driven wells	3
Caliente	Springs	Average 10-12
Crystal Springs	Free flowing spring	0
Alamo	2 wells—50-67' deep	Average 175
Pahranagat Lake	Surface	Not used for domestic purposes
Butler Ranch	Flowing spring	1
Warm Spring Ranch	Flowing spring from earth fault	Public park with swimming pool
Logandale	Drilled well	300
Ballistic Range	Drilled well	10-15

GROSS BETA MEASUREMENTS IN WATER SUPPLIES IN OFF-SITE AREAS OF
 THE NEVADA TEST SITE FOR JANUARY-FEBRUARY 1960
 $(\mu\text{c}/\text{ml}$ at count time)

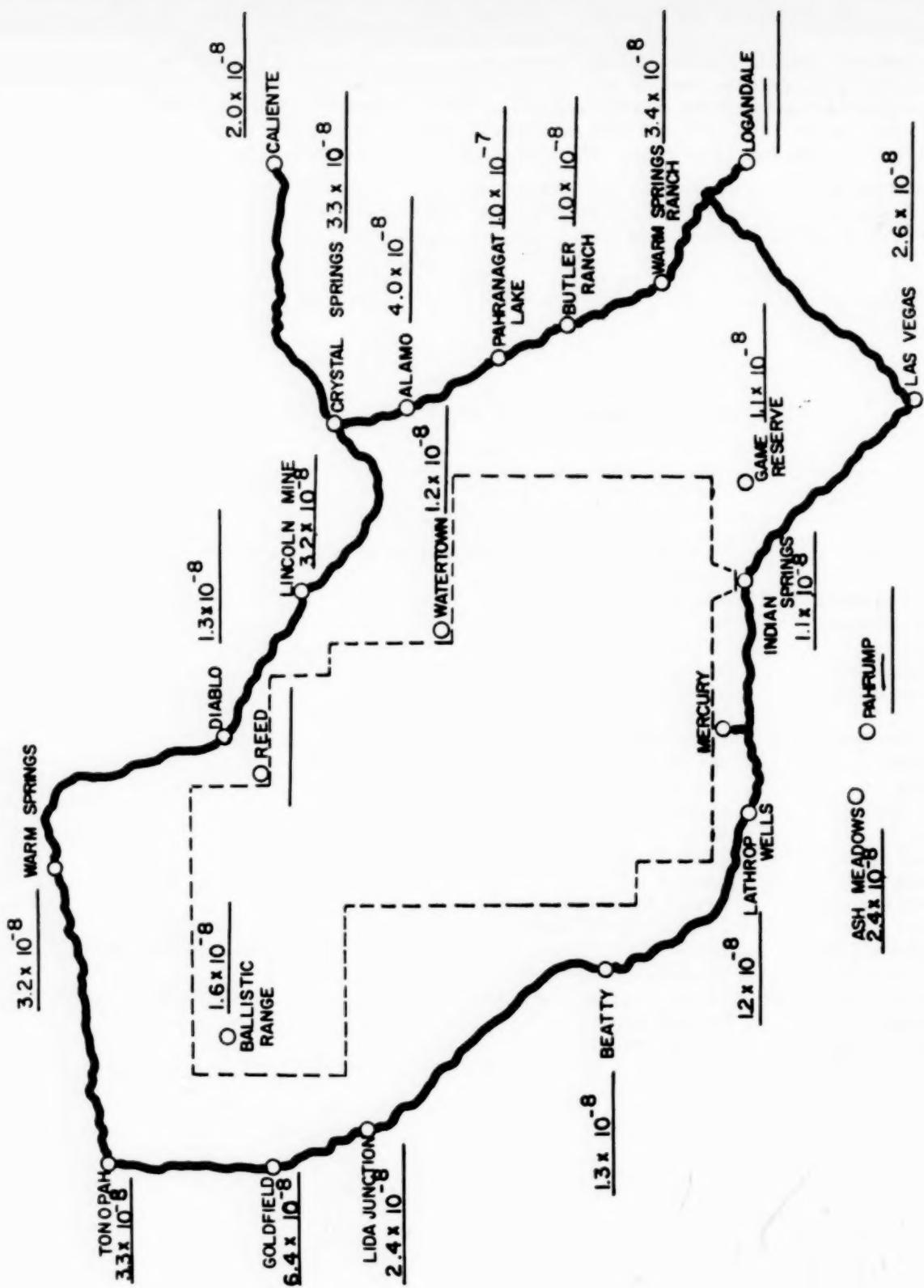


FIGURE 12

FIGURE 12

GROSS BETA MEASUREMENTS IN WATER SUPPLIES IN OFF-SITE AREAS OF
THE NEVADA TEST SITE FOR MARCH-APRIL 1960
($\mu\text{c}/\text{ml}$ at count time)

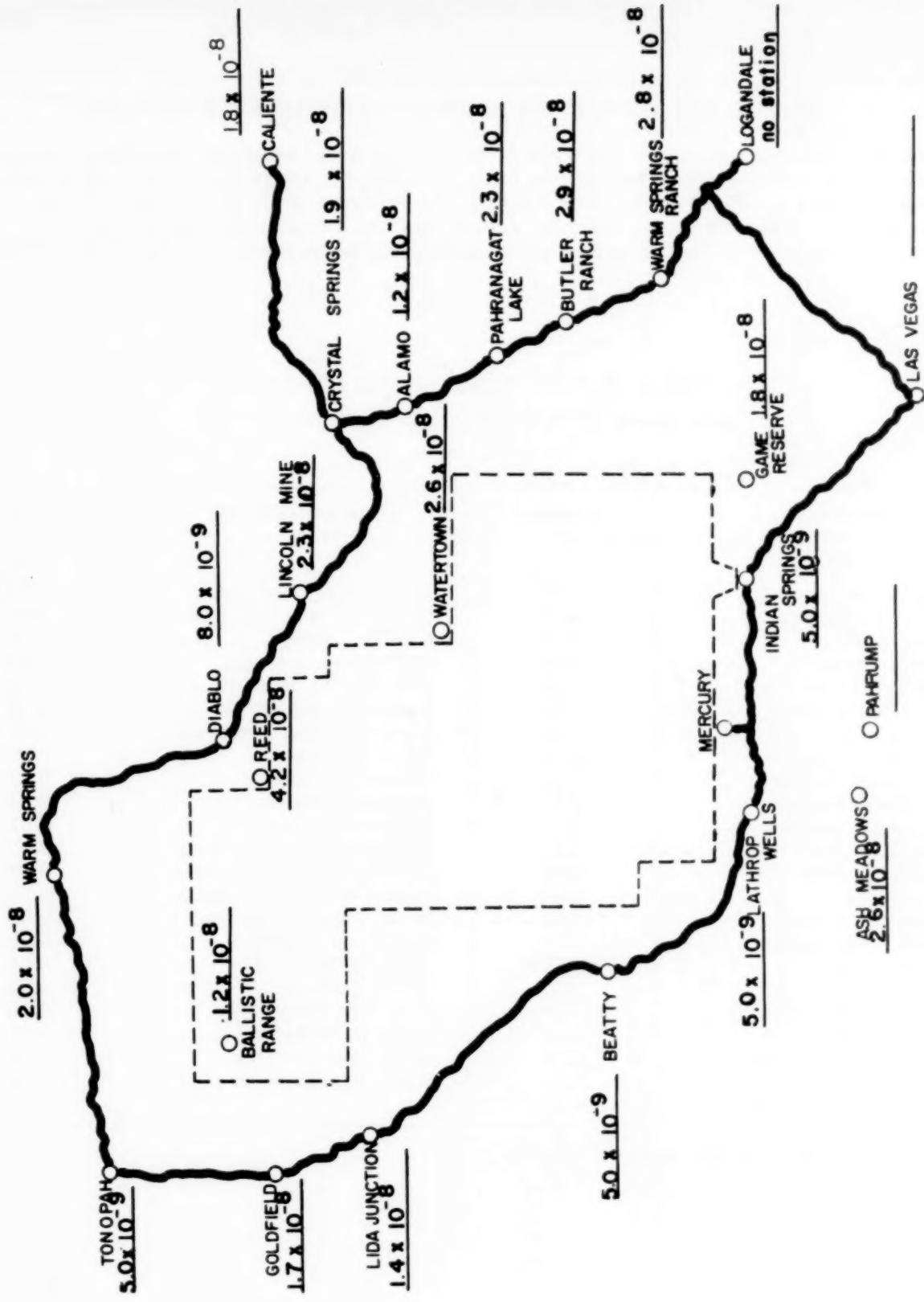


FIGURE 13

SECTION IV.—OTHER DATA

EXTERNAL GAMMA ACTIVITY PUBLIC HEALTH SERVICE RADIATION SURVEILLANCE NETWORK

Portable survey instruments are available at the stations of the Radiation Surveillance Network and one of their uses is to record external gamma radiation. These readings are not precise, especially for measurement of low levels but they can show the presence or absence of any significant increases above background. The differences among the values shown on the following table are within the variances anticipated due to differences in normal background and in instrument response characteristics.

TABLE XI.—EXTERNAL GAMMA ACTIVITY
Public Health Service Radiation Surveillance Network
April 1960

Station location	Average*	Station location	Average*
Alaska, Anchorage	0.01	Mississippi, Pascagoula	mr/hr (**)
Alaska, Fairbanks	0.01	Missouri, Jefferson City	0.01
Alaska, Juneau	0.02	Montana, Helena	0.03
Arizona, Phoenix	0.02	New Jersey, Trenton	0.02
Arkansas, Little Rock	0.02	New Mexico, Santa Fe	0.04
California, Berkeley	0.01	New York, Albany	0.02
California, Los Angeles	0.01	North Carolina, Gastonia	0.02
Colorado, Denver	0.02	Ohio, Cincinnati	(**)
Connecticut, Hartford	0.01	Oklahoma, Oklahoma City	0.02
District of Columbia	0.02	Oklahoma, Ponca City	0.04
Florida, Jacksonville	0.02	Oregon, Portland	0.02
Georgia, Atlanta	0.02	Pennsylvania, Harrisburg	0.01
Hawaii, Honolulu	0.02	Rhode Island, Providence	0.02
Idaho, Boise	0.01	South Carolina, Columbia	0.02
Illinois, Springfield	0.01	South Dakota, Edgemont	0.02
Indiana, Indianapolis	0.01	South Dakota, Pierre	0.02
Iowa, Iowa City	0.02	Texas, Austin	0.01
Kansas, Topeka	0.02	Texas, El Paso	0.02
Louisiana, New Orleans	0.02	Utah, Salt Lake City	0.02
Maryland, Baltimore	0.02	Virginia, Richmond	0.01
Massachusetts, Lawrence	0.02	Washington, Seattle	0.02
Michigan, Lansing	0.02	Wyoming, Cheyenne	0.02
Minnesota, Minneapolis	0.01		

*Readings taken three feet above the ground.

**No data received.

FOOD CONSUMPTION OF HOUSEHOLDS IN THE UNITED STATES

Northeast and North Central Regions

As a necessary step in the evaluation of the radiological aspects of radioactivity in foods, there must be estimates of the kinds and amounts of food used. The Department of Agriculture is preparing a series of such estimates, the first of which were for the United States as a whole and appeared in the August issue of Radiological Health Data. Two additional reports, "Food Consumption Per Person in Households in the Northeast Region of the United States," and "Food Consumption Per Person in Households in the North Central Region of the United States" have been completed and are reproduced here-with.

Two remaining reports, covering the Western and Southern Regions of the United States, will be printed in the October issue.

FOOD CONSUMPTION SURVEY REGIONS

U. S. Department of Agriculture

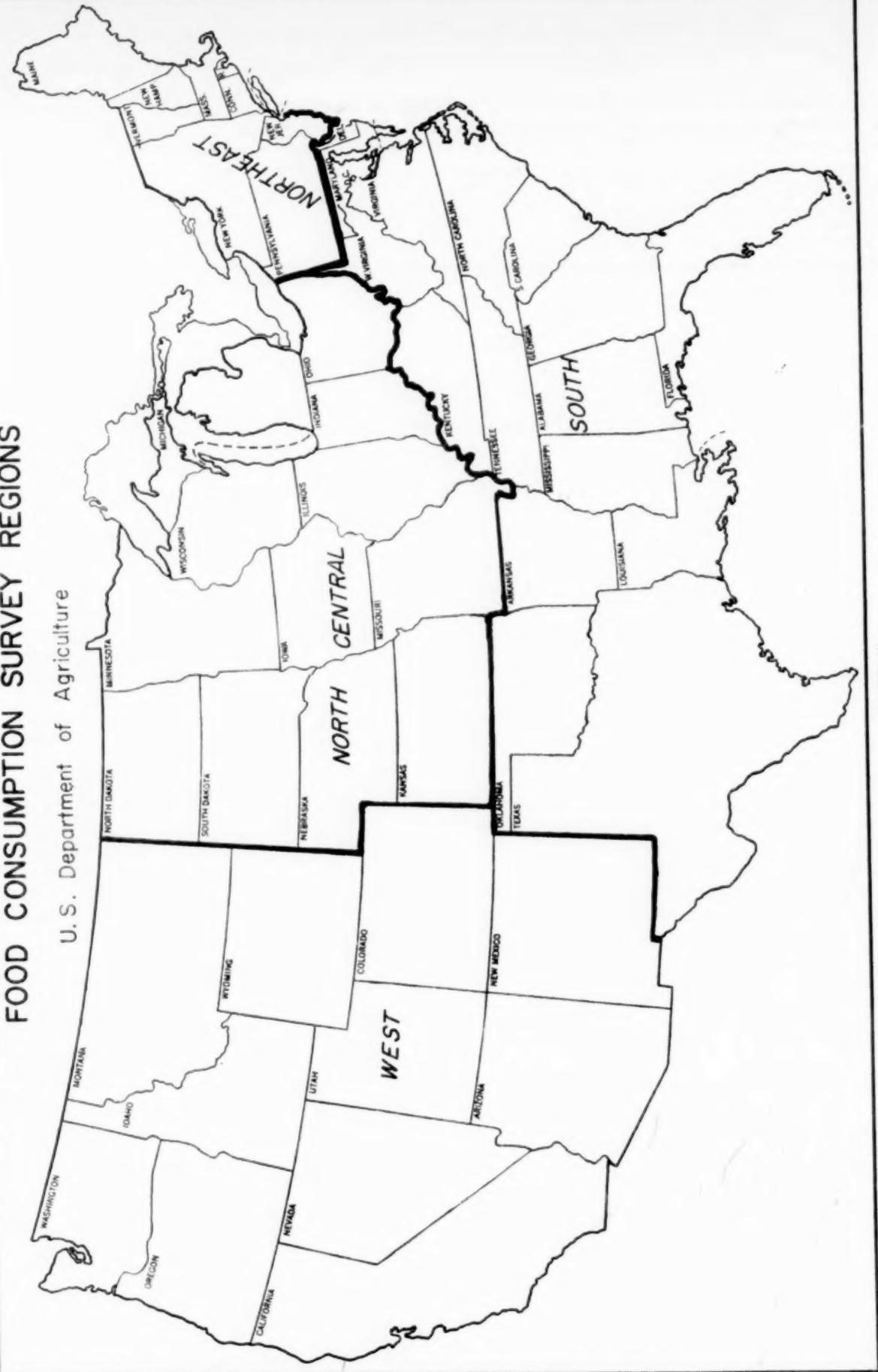


FIGURE 14

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Household Economics Research Division
Washington 25, D. C.

Tables XII and XIII showing average "per person quantities" of foods used per week (in pounds) and per day (in grams), have been derived from data in "Household Food Consumption Survey," 1955, Reports No. 2 and No. 3, available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price \$1.00 per copy.

Averages are for foods used at home during a week in the spring, as brought into the household, and are based on all housekeeping households in the respective sections of the country. "Per person quantities" were computed by dividing "household quantities" by the "average household size" (3.20 in the Northeast, and 3.31 in the North Central region). "Average household size" was derived by dividing by 21 the total number of meals served from family food supplies during the survey week.

For some purposes, information on the consumption of those actually using a given food is more useful than averages based on all persons. An approximate but not precise figure can be computed from these data. Information was obtained in the survey on household use only—not on the individual member use of foods. Estimated quantities of food per person may be obtained by dividing the "quantities used per person per week" based on all households by the "percentage of households using" shown in the second column. For example, the estimate of the average per-person use of commercially baked white bread per week (in Northeastern households using) is 1.41 pounds, derived by dividing 1.23 from the third column by 0.872 from the second column, page 39. Such an estimate understates the value for those actually using the food, since it is not reasonable to assume that all members of all households reporting such use of the food actually used some of the item. The understatement is probably small for such items as bread, sugar, etc., that in many households are likely to be eaten by every member, but it may be considerable for items such as tea, coffee, or baby foods that are less likely to be used by all members.

The estimate of the "quantity per person using" an item computed from this table will also be understated when the average size of household utilizing food is smaller than the average of all households. The average size of households using lamb and mutton for instance, is approximately 3.07 instead of 3.33 persons (all U. S.) and the average "per person per week" in households using is 0.84 pounds rather than the 0.77 pounds computed from the figures in this table (see August 1960 issue).

On the other hand, the estimated average computed from this table will be overstated when the average size of the households using is larger than that of all households. This is true, for example, for such items as ice cream (3.55 persons) and breakfast cereals (3.48 persons).

While estimates computed from these data will provide an indication of the importance of an item in the individual diet, they do not show the maximum likely to be used, such as would be shown by the percentage distribution using specified amounts per person. Also, since the averages for those using the items are not additive, combinations of items cannot be easily estimated.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION
OF THE UNITED STATES, 1955
U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Milk, cream, ice cream, cheese (fluid milk equivalent ¹).....	Percent	Pounds	Grams
Fresh fluid milk, total	99.9	9.72	630
Whole	97.3	7.37	478
Buttermilk	96.1	.70	453
Skim	7.1	.09	6
Chocolate (commercial)	7.5	.20	13
Half and half, extra rich	5.6	.08	5
.2		(*)	(*)
Processed milk:			
Evaporated	28.9	.22	14
Condensed	1.4	.01	(*)
Dry, total	9.8	.02	1
Nonfat	5.5	.02	1
Whole	2.2	.01	(*)
Products, nonfat and whole ²	2.7	(*)	(*)
Cream, total ³	30.3	.10	6
Light	10.5	.04	2
Heavy, whipped, whip topping	21.0	.06	4
Ice Cream, ice milk (commercial) ⁴	60.8	.34	22
Cheese, total.....	85.6	.33	22
Cottage	33.5	.11	7
Nonprocessed, total ⁵	40.4	.08	5
American-type	12.9	.03	2
Swiss	7.4	.01	1
Cream	18.2	.02	1
Other	10.7	.02	1
Processed, total ⁶	58.3	.14	9
American, Swiss, cream, other	53.0	.12	8
Cheese spreads	9.5	.02	1
Fats and oils, total	99.6	.76	49
Table fats, total	98.4	.43	28
Butter	72.7	.24	16
Margarine	50.4	.19	12
Shortening, total	53.3	.13	9
Lard ⁷	12.7	.04	3
Other	43.7	.09	6
Salad and cooking oils	29.5	.08	5
Salad dressings (commercial), total	62.4	.12	8
Mayonnaise and mayonnaise-type.....	40.3	.06	4
French and french-type	10.8	.01	1
Other ⁸	18.5	.05	3

* Less than 0.005 pounds or 0.5 grams.

¹Approximately the quantity of fluid milk to which the various dairy products (except butter) are equivalent in calcium.

²Chiefly dry cocoa mixes.

³Includes small amounts of powdered cream, not shown separately.

⁴Includes frozen custard and frozen desserts with vegetable fats.

⁵Includes quantities of cheese for which respondent could not report whether or not processed.

⁶Includes small amounts of cheese food, not shown separately.

⁷Includes small amounts of chicken fat.

⁸Includes sandwich spreads.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION
OF THE UNITED STATES, 1955—Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
	Percent	Pounds	Grams
Flour and other cereal products, total	95.9	1.03	67
Flour other than mixes, total	59.4	.32	21
White	59.0	.32	21
Other	1.4	.01	(*)
Prepared flour mixes, total	36.6	.17	11
Pancake	12.3	.03	2
Cake	16.6	.08	5
Biscuit, roll, muffin	10.5	.03	2
Other	9.2	.03	2
Breakfast cereals (excluding baby cereals), total	77.4	.25	16
Ready-to-eat, total	69.1	.19	12
Corn flakes	39.1	.07	4
Wheat, flaked, puffed, shredded	37.5	.07	5
Rice, flaked, puffed, etc.	20.9	.02	2
Other	14.2	.02	2
Hot, total ⁹	24.7	.06	4
Rolled oats, oatmeal	18.9	.04	3
Wheat cereals	8.6	.02	1
Other cereals, total	68.0	.29	19
Baby cereals	7.4	.01	1
Rice	23.4	.06	4
Cornmeal, grits, total	4.2	.01	1
Cornmeal	2.9	.01	(*)
Hominy grits	1.7	.01	(*)
Hominy (big)2	(*)	
Macaroni, spaghetti, noodles	51.5	.19	12
Popcorn	4.7	.01	1
Other ¹⁰	11.0	.01	1
Bakery products, total	99.0	2.22	144
Bread, total	97.2	1.53	99
White ¹¹	87.2	1.23	80
Whole wheat	17.2	.10	6
Other	39.8	.20	13
Baked goods other than bread, total	86.6	.69	45
Crackers, total	55.9	.15	10
Sweet	12.2	.03	2
Not sweet	50.5	.13	8
Rolls, total	22.6	.07	4
Ready-to-eat	18.3	.05	3
Brown and serve	5.0	.01	1
Biscuits, muffins	6.0	.01	1
Cakes	28.0	.14	9
Pies	17.4	.10	6
Other ¹²	53.9	.22	14

⁹Includes small amounts of other hot cereals not shown separately.

¹⁰Includes tapioca, cornstarch, barley, buckwheat grits.

¹¹Practically all reported as enriched.

¹²Includes cookies, doughnuts, sweet buns, coffee cake, etc.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION OF THE UNITED STATES, 1955--Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Eggs.....	98.9	0.78	51
Meat, poultry, fish, total	99.6	4.33	281
Meat, total	99.1	3.07	199
Beef, total.....	93.3	1.29	83
Steak, fresh, frozen, total.....	53.9	.39	26
Round	23.9	.16	10
Other	35.3	.24	15
Roast, fresh, frozen, total	30.2	.36	23
Rib	7.1	.09	6
Other	23.7	.27	17
Stewing, boiling, fresh, frozen.....	18.4	.11	7
Corned, chipped, dried	8.6	.03	2
Ground, fresh, frozen	66.1	.39	25
Canned (commercial)	1.6	(*)	(*)
Veal, total ¹³	20.5	.12	8
Roast, shoulder, fresh, frozen.....	4.5	.04	3
Chops, cutlets, fresh, frozen.....	15.4	.08	5
Pork, total	84.5	.98	63
Fresh, frozen, total.....	50.9	.47	31
Chops	31.5	.17	11
Ham	7.4	.07	5
Loin	8.1	.09	6
Sausage	12.3	.05	3
Other	8.8	.08	5
Cured, smoked, total	73.0	.48	31
Ham, raw, precooked.....	30.9	.24	16
Bacon	58.6	.17	11
Salt pork	4.8	.01	1
Other	9.5	.06	4
Canned (commercial)	1.8	.02	1
Lamb, mutton, total.....	23.0	.19	12
Chops, steak, fresh, frozen.....	14.8	.08	5
Roast, shoulder, leg, fresh, frozen	7.0	.09	6
Stewing, soup, ground, patties	2.1	.02	1
Variety meats and game, total.....	27.8	.13	8
Liver	23.5	.09	6
Other ¹⁴	6.0	.04	3
Luncheon meats, total.....	70.1	.37	24
Frankfurters	40.0	.16	10
Other, total.....	58.1	.21	14
Canned	3.7	.01	1
Other	56.4	.20	13
Poultry, total ¹⁵	54.9	.83	54
Chicken ¹⁶	51.1	.69	45
Turkey ¹⁶	4.3	.12	7

¹³Includes small amounts of other veal, not shown separately.

¹⁴Includes tongue, kidney, heart, tripe, etc.; game.

¹⁵Includes small amounts of other poultry, not shown separately.

¹⁶Chiefly fresh or frozen, only small amounts of canned reported.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION
OF THE UNITED STATES, 1955—Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Meat, poultry, fish—Con.		Percent	Pounds
Fish and shellfish, total.....	74.4	0.44	29
Fish, total ¹⁷	68.4	.34	22
Canned (commercial), total.....	39.8	.09	6
Salmon	11.4	.03	2
Tuna	28.1	.05	3
Other ¹⁸	6.2	.01	1
Fresh, frozen.....	40.1	.24	16
Shellfish, fresh, frozen, canned	17.6	.10	6
Sugar, sweets, total.....	95.6	.99	64
Sugar, total.....	91.7	.67	43
White, total.....	91.5	.65	42
Granulated.....	91.4	.60	39
Confectioners, powdered	14.7	.05	3
Brown	9.5	.02	1
Sirups, molasses, honey, total.....	26.8	.07	4
Sirups, total.....	18.4	.05	3
Corn, cane	6.5	.02	1
Maple, sorghum, other ¹⁹	12.5	.03	2
Molasses	5.9	.01	1
Honey.....	4.9	.01	1
Jellies, jams, total	57.1	.13	9
Jellies	31.0	.06	4
Jams, preserves, fruit butters, etc.....	32.3	.07	4
Candies (commercial), total.....	42.2	.12	8
With nuts	15.0	.03	2
Without nuts	32.3	.09	6
Potatoes, sweetpotatoes, total.....	94.2	1.96	127
Fresh, total	92.4	1.90	123
White.....	91.7	1.85	120
Sweetpotatoes	7.5	.05	3
Frozen ²⁰	8.7	.02	2
Canned, dehydrated ²¹	1.4	(*)	(*)
Potato chips and sticks ²²	19.0	.03	2
Fresh vegetables, total ²³	98.7	2.64	171
Dark green and deep yellow, total ²⁴	75.4	.51	33
Dark green leafy, total.....	30.8	.15	10
Spinach	15.9	.06	4
Other	18.9	.09	6
Broccoli	9.0	.06	4
Carrots	59.7	.24	16
Peppers, green	22.9	.05	3

¹⁷Includes small amounts of smoked, cured fish, not shown separately.

¹⁸May include small amount of ready-cooked fish, not canned.

¹⁹See page 44 for chocolate syrup.

²⁰Chiefly french fried.

²¹Chiefly canned sweetpotatoes.

²²Chiefly chips.

²³Includes home canned and frozen vegetables that were brought into the home in fresh form.

²⁴Includes other dark green and deep yellow vegetables not shown separately.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION OF THE UNITED STATES, 1955—Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Fresh vegetables, Con.		Percent	Pounds
Other green, total	88.8	0.94	61
Asparagus	25.2	.16	10
Beans, snap, wax	26.9	.12	8
Cabbage	31.7	.25	16
Lettuce	74.6	.34	22
Peas	7.8	.04	2
Other	6.3	.03	2
Tomatoes	67.6	.34	22
Other than tomatoes and green and deep yellow, total	91.7	.85	55
Celery	44.5	.13	9
Cucumbers	28.0	.10	7
Mature onions	73.8	.29	19
Green onions	14.6	.03	2
Other, total ²⁵	45.9	.30	19
Corn.....	16.2	.12	8
Fresh fruits, total ²⁶	92.8	2.93	190
Citrus, total ²⁷	68.4	1.24	80
Grapefruit	29.5	.38	25
Lemons, limes ²⁸	24.6	.06	4
Oranges	50.7	.79	51
Other than citrus, total ²⁹	86.0	1.69	110
Apples	46.8	.41	27
Bananas	56.3	.44	29
Melons.....	19.9	.33	22
Rhubarb	11.9	.08	5
Strawberries	21.8	.17	11
Avocados	2.6	.01	1
Berries other than strawberries	3.7	.02	1
Cherries	8.1	.04	3
Peaches	9.3	.08	5
Other	14.5	.10	7
Commercially frozen fruits and vegetables	44.1	.22	14
Fruits ³⁰	11.7	.03	2
Vegetables other than potatoes, total	38.4	.19	12
Beans, lima	9.5	.02	2
Beans, snap, wax	9.8	.02	2
Broccoli	10.6	.02	2
Peas	14.4	.04	3
Spinach	7.3	.02	1
Corn	3.3	.01	1
Other	14.3	.04	3

²⁵Includes beets, cauliflower, turnips, rutabagas, and others not shown separately.

²⁶Includes home canned and frozen fruits that were brought into the home in fresh form.

²⁷Includes small amounts of tangerines and kumquats not shown separately.

²⁸Chiefly lemons.

²⁹Includes small amounts of figs and grapes not included in "Other."

³⁰Chiefly strawberries.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION
OF THE UNITED STATES, 1955—Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
	Percent	Pounds	Grams
Commercially canned fruits and vegetables, total ..	86.1	1.23	80
Fruits, except baby and junior foods, total	53.8	.42	27
Apples, applesauce	20.0	.09	6
Apricots	3.7	.02	1
Berries	4.4	.02	1
Cherries	4.8	.01	1
Peaches	18.3	.09	6
Pears	10.2	.05	3
Pineapple	11.9	.05	3
Plums, prunes	2.4	.01	1
Mixed fruit, fruit cocktail	10.9	.05	3
Other	6.8	.03	2
Baby, junior foods, including juices	8.9	.05	3
Vegetables, except baby and junior foods, total ³¹	74.4	.73	47
Asparagus	3.7	.01	1
Baked beans, or other mature beans	16.7	.09	6
Beans, lima, green, immature	3.8	.01	1
Beans, snap, wax	21.8	.10	6
Beets	15.6	.05	3
Corn	24.8	.11	7
Peas, green, immature	31.5	.14	9
Tomatoes, total	27.7	.15	10
Pulp	14.0	.08	5
Puree, paste	19.3	.07	4
Other	20.2	.08	5
Baby, junior foods, incl. potatoes	5.8	.03	2
Fruit and vegetable juices, fresh, frozen, canned, powdered ^{32, 33}	73.2	1.31	85
Canned citrus, total ^{32, 34}	21.7	.28	18
Orange	11.1	.18	11
Grapefruit	8.6	.08	5
Canned fruit other than citrus ³²	29.5	.27	17
Canned tomato and other vegetable juices ^{32, 35}	26.7	.20	13
Frozen, concentrated, total	31.5	.14	9
Orange	28.3	.12	8
Other	6.7	.02	1
Fresh (commercial)	4.6	.05	3
Dried fruits and vegetables, total ³⁶	31.3	.11	7
Dried fruit, total	18.3	.05	3
Prunes	8.2	.03	2
Raisins, currants	9.2	.02	1
Other	4.3	.01	1

³¹Includes small amounts of mature peas not included in "Other."

³²Single strength equivalent.

³³Does not include baby or junior juices. See above.

³⁴Includes orange and grapefruit blend and other citrus juices not shown separately.

³⁵Includes both commercially and home-canned and frozen juices.

³⁶Includes both commercially and home-dried fruits and vegetables.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION OF THE UNITED STATES, 1955—Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Dried fruits and vegetables—Con.		Percent	Pounds
Dry vegetables, total	16.0	0.05	3
Beans, total	11.7	.04	3
Lima	3.7	.01	1
Navy, pinto, kidney, other	8.3	.03	2
Peas, lentils, other	5.2	.01	1
Beverages:			Grams
Coffee, total ³⁷	91.9	.23	15
Bean, ground	68.0	.22	14
Instant, powdered	31.3	.02	1
Substitute	3.2	(*)	(*)
Tea ³⁸	29.0	.03	2
Chocolate, cocoa, chocolate syrup, total	21.3	.03	2
Chocolate	5.6	.01	(*)
Cocoa	12.3	.01	1
Chocolate syrup	4.9	.01	1
Soft drinks, fruit ades, total	58.3	.93	61
Soft drinks, bottled and canned, total	53.7	.90	58
Cola-type	26.2	.39	25
Fruit flavored	14.8	.20	13
Other	24.1	.31	20
Powdered	4.1	(*)	(*)
Fruit ades, total	8.1	.03	2
Frozen	6.2	.02	1
Other	2.0	.01	1
Miscellaneous foods:			
Nuts (shelled weight) and peanut butter, total	46.3	.09	6
Nuts (shelled weight), total	20.0	.03	2
Peanuts	8.4	.02	1
Other	13.5	.02	1
Peanut butter	33.9	.06	4
Soups, except canned baby soups, total	49.2	.24	16
Vegetable, total	35.3	.14	9
Condensed	30.3	.13	9
Other	4.7	.01	1
Meat, fish, grain, total	25.5	.10	6
Condensed	21.7	.09	6
Other	5.2	.01	1
Catsup, chili sauce, etc., total ³⁹	48.3	.12	8
Catsup	38.0	.06	4
Chili sauce	3.2	.01	(*)
Barbecue sauce, etc.	13.2	.04	3
Tomato relishes	3.8	.01	1
Pickles, olives, relishes, total ³⁹	38.8	.12	7
Pickles	27.2	.08	5
Olives	14.7	.02	1
Relishes other than tomato	6.3	.01	1

³⁷Includes small amounts of liquid concentrate coffee, not shown separately.

³⁸Data refers to amounts bought during the 7-day survey period rather than the amounts used.

³⁹Includes both commercial and homemade products.

TABLE XII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE NORTHEAST REGION
OF THE UNITED STATES, 1955—Con.

U. S. Department of Agriculture

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Miscellaneous foods—Con.	Percent	Pounds	Grams
Puddings, pie fillings, miscellaneous sweets (commercial), total ⁴⁰	43.4	.09	6
Puddings, pie fillings ⁴¹	37.4	.06	4
Strained canned puddings (baby).....	3.3	.01	1
Sherbets, ices.....	5.1	.02	1
Icing mix, fudge mix.....	2.4	(*)	(*)
Other mixtures, prepared or partially prepared, total.....	37.0	.22	14
Mixtures other than baby, junior foods, total	32.7	.18	12
Without meat ⁴²	15.1	.06	4
With meat ⁴³	23.0	.12	8
Baby, junior foods, total.....	7.1	.04	3
Meat, mixtures with meat.....	6.7	.03	2
Without meat.....	2.4	.01	(*)
Leavening agents, total ⁴⁴	10.5	.02	1
Yeast.....	6.3	(*)	(*)
Other ⁴⁴	5.2	.01	1
Seasonings ⁴⁴			
Vinegar.....	9.8	.05	3
Salt.....	17.3	.09	6

⁴⁰Includes other miscellaneous sweets not shown separately.

⁴¹Chiefly dry, including plain gelatin.

⁴²Includes spaghetti with tomato sauce, potato salad, cole slaw, macaroni and cheese dinners, chow mein and chop suey dinners, and others.

⁴³Includes poultry and meat pies, spaghetti with meat balls, corned beef hash, chili con carne, ravioli, tamales, and others.

⁴⁴Data refer to amount bought during the 7-day survey period rather than the amounts used.

TABLE XIII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Milk, cream, ice cream, cheese (fluid milk equivalent ¹).....	Percent	Pounds	Grams
Fresh fluid milk, total.....	99.9	10.24	663
Whole.....	97.2	8.05	522
Buttermilk.....	95.2	7.52	487
Skim.....	11.3	.14	9
Chocolate (commercial).....	6.2	.24	16
Half and half, extra rich.....	6.0	.07	5
Half and half, regular.....	14.2	.08	5
Processed milk:			
Evaporated.....	22.2	.16	10
Condensed.....	2.1	.01	1
Dry, total.....	10.8	.02	2
Nonfat.....	5.0	.01	1
Whole.....	1.8	.01	(*)
Products, nonfat and whole ²	4.3	.01	1
Cream, total ³	28.8	.12	8
Light.....	9.2	.04	3
Heavy, whipped, whip topping.....	20.4	.08	5
Ice cream, ice milk (commercial) ⁴	64.5	.47	30
Cheese, total.....	82.2	.38	25
Cottage.....	48.2	.20	13
Nonprocessed, total ⁵	31.5	.07	5
American-type.....	15.5	.04	3
Swiss.....	3.4	.01	(*)
Cream.....	10.1	.02	1
Other.....	6.2	.01	1
Processed, total ⁶	48.9	.11	7
American, Swiss, cream, other.....	41.5	.10	6
Cheese spreads.....	9.6	.02	1
Fats and oils, total.....	99.5	88	57
Table fats, total.....	98.4	.44	29
Butter.....	67.1	.25	16
Margarine.....	55.1	.19	12
Shortening, total.....	74.5	.24	15
Lard ⁷	26.5	.10	6
Other.....	53.6	.14	9
Salad and cooking oils.....	19.8	.04	3
Salad dressings (commercial), total.....	69.1	.16	10
Mayonnaise and mayonnaise-type.....	32.1	.05	3
French and french-type.....	25.1	.02	2
Other ⁸	29.9	.08	5

* Less than 0.005 pounds or 0.5 grams.

¹ Approximately the quantity of fluid milk to which the various dairy products (except butter) are equivalent in calcium.

² Chiefly dry cocoa mixes.

³ Includes small amounts of powdered cream, not shown separately.

⁴ Includes frozen custard and frozen desserts with vegetable fats.

⁵ Includes quantities of cheese for which respondent could not report whether or not processed.

⁶ Includes small amounts of cheese food, not shown separately.

⁷ Includes small amounts of chicken fat.

⁸ Includes sandwich spreads.

TABLE XIII.--FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955--Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Flour and other cereal products, total.....	Percent	Pounds	Grams
	97.4	1.40	91
Flour other than mixes, total.....	84.6	.62	40
White	84.6	.61	40
Other	1.9	.01	1
Prepared flour mixes, total.....	46.6	.22	14
Pancake	15.6	.04	3
Cake	26.4	.12	8
Biscuit, roll, muffin	13.7	.04	3
Other	8.0	.02	2
Breakfast cereals (excluding baby cereals), total..	83.0	.28	18
Ready-to-eat, total	73.9	.21	13
Corn flakes	39.9	.08	5
Wheat, flaked, puffed, shredded.....	41.2	.08	5
Rice, flaked, puffed, etc.....	17.6	.02	1
Other	17.4	.03	2
Hot, total ⁹	34.3	.08	5
Rolled oats, oatmeal	28.3	.06	4
Wheat cereals.....	11.1	.02	1
Other cereals, total	67.8	.27	18
Baby cereals.....	9.1	.01	1
Rice.....	20.7	.04	3
Cornmeal, grits, total	11.3	.05	3
Cornmeal.....	10.8	.05	3
Hominy grits	1.4	(*)	(*)
Hominy (big).....	1.9	.01	1
Macaroni, spaghetti, noodles	42.0	.12	8
Popcorn	13.8	.03	2
Other ¹⁰	16.5	.01	1
Bakery products, total.....	98.4	2.25	146
Bread, total.....	95.7	1.62	105
White ¹¹	88.3	1.36	88
Whole wheat	19.5	.11	7
Other	31.1	.15	10
Baked goods other than bread, total.....	85.1	.63	41
Crackers, total.....	57.9	.14	9
Sweet	14.8	.03	2
Not sweet.....	53.1	.11	7
Rolls, total.....	20.9	.06	4
Ready-to-eat.....	13.2	.04	2
Brown and serve.....	9.2	.03	2
Biscuits, muffins	7.1	.02	1
Cakes.....	20.1	.11	7
Pies	7.5	.04	2
Other ¹²	55.9	.27	17

⁹ Includes small amounts of other hot cereals not shown separately.

¹⁰ Includes tapioca, cornstarch barley, buckwheat grits.

¹¹ Practically all reported as enriched.

¹² Includes cookies, doughnuts, sweet buns, coffee cake, etc.

TABLE XIII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955—Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Eggs	Percent 98.6	Pounds 0.87	Grams 56
Meat, poultry, fish, total.....	100.0	4.37	283
Meat, total.....	99.9	3.38	219
Beef, total.....	94.0	1.51	98
Steak, fresh, frozen, total.....	58.9	.47	31
Round.....	31.6	.21	14
Other	37.3	.26	17
Roast, fresh, frozen, total.....	40.9	.44	28
Rib	8.9	.11	7
Other	33.0	.33	22
Stewing, boiling, fresh, frozen.....	19.7	.12	8
Corned, chipped, dried.....	9.7	.02	1
Ground, fresh, frozen.....	68.4	.46	30
Canned (commercial).....	2.2	.01	(*)
Veal, total ¹³	11.6	.07	5
Roast, shoulder, fresh, frozen.....	2.6	.03	2
Chops, cutlets, fresh, frozen.....	7.6	.04	2
Pork, total.....	91.5	1.23	79
Fresh, frozen, total.....	63.3	.60	39
Chops.....	41.5	.24	15
Ham.....	3.3	.03	2
Loin.....	11.5	.11	7
Sausage	21.2	.10	6
Other	14.7	.12	8
Cured, smoked, total.....	80.2	.60	39
Ham, raw, precooked.....	34.8	.30	19
Bacon	68.5	.25	16
Salt pork.....	2.4	.01	1
Other	9.5	.05	3
Canned (commercial).....	2.7	.02	2
Lamb, mutton, total.....	7.0	.05	3
Chops, steak, fresh, frozen.....	4.9	.02	2
Roast, shoulder, leg, fresh, frozen.....	1.4	.02	1
Stewing, soup, ground, patties.....	1.1	.01	(*)
Variety meats and game, total.....	20.6	.10	6
Liver	17.1	.06	4
Other ¹⁴	4.8	.04	2
Luncheon meats, total.....	74.8	.42	27
Frankfurters	42.8	.16	10
Other, total.....	63.1	.26	17
Canned	5.0	.01	1
Other	60.6	.25	16
Poultry, total ¹⁵	50.6	.65	42
Chicken ¹⁶	48.8	.59	38
Turkey ¹⁶	2.0	.05	3

¹³ Includes small amounts of other veal, not shown separately.

¹⁴ Includes tongue, kidney, heart, tripe, etc.; game.

¹⁵ Includes small amounts of other poultry, not shown separately.

¹⁶ Chiefly fresh or frozen, only small amounts of canned reported.

TABLE XIII.--FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955--Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Meat, poultry, fish--Con.			
Fish and shellfish, total.....	Percent	Pounds	Grams
Fish, total ¹⁷	56.3	.34	22
Canned (commercial), total.....	53.8	.32	21
Salmon.....	33.1	.08	5
Tuna.....	12.6	.04	2
Other ¹⁸	20.6	.04	2
Fresh, frozen.....	4.2	.01	(*)
Shellfish, fresh, frozen, canned.....	27.5	.24	15
Shellfish, fresh, frozen.....	6.7	.02	1
Sugar, sweets, total.....	97.9	1.28	83
Sugar, total.....	95.5	.86	56
White, total.....	95.4	.82	53
Granulated.....	95.0	.75	48
Confectioners, powdered.....	25.9	.08	5
Brown.....	21.4	.04	3
Sirups, molasses, honey, total.....	33.5	.09	6
Sirups, total.....	26.9	.08	5
Corn, cane.....	13.1	.04	3
Maple, sorghum, other ¹⁹	15.0	.04	2
Molasses.....	2.1	(*)	(*)
Honey.....	8.0	.02	1
Jellies, jams, total.....	67.6	.19	12
Jellies.....	39.8	.09	6
Jams, preserves, fruit butters, etc.....	36.7	.10	6
Candy (commercial), total.....	43.0	.13	8
With nuts.....	13.4	.03	2
Without nuts.....	34.3	.10	6
Potatoes, sweetpotatoes, total.....	94.9	2.19	142
Fresh, total.....	94.2	2.09	135
White.....	93.9	2.05	133
Sweetpotatoes.....	5.6	.04	2
Frozen ²⁰	3.5	.01	1
Canned, dehydrated ²¹	4.5	.02	2
Potato chips and sticks.....	26.8	.06	4
Fresh vegetables, total ²³	98.1	2.45	159
Dark green and deep yellow, total ²⁴	67.5	.37	24
Dark green leafy, total.....	16.3	.09	6
Spinach.....	5.9	.02	2
Other.....	12.5	.06	4
Broccoli.....	4.4	.03	2
Carrots.....	57.5	.22	14
Peppers, green.....	21.2	.03	2

¹⁷ Includes small amounts of smoked, cured fish, not shown separately.

¹⁸ May include small amount of ready-cooked fish, not canned.

¹⁹ See page 52 for chocolate sirup.

²⁰ Chiefly french fried.

²¹ Chiefly canned sweetpotatoes.

²² Chiefly chips.

²³ Includes home canned and frozen vegetables that were brought into the home in fresh form.

²⁴ Includes other dark green and deep yellow vegetables not shown separately.

TABLE XIII.--FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955--Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Fresh vegetables--Con.		Percent	Pounds
Other green, total.....	90.2	0.99	64
Asparagus.....	17.6	.10	6
Beans, snap, wax.....	23.9	.13	9
Cabbage.....	35.9	.27	18
Lettuce.....	80.5	.44	29
Peas.....	6.2	.03	2
Other	3.6	.02	1
Tomatoes.....	56.7	.32	21
Other than tomatoes and green and deep yellow, total.....	90.8	.76	50
Celery.....	48.3	.14	9
Cucumbers.....	24.3	.08	5
Mature onions.....	61.9	.19	13
Green onions	30.0	.07	4
Other, total ²⁵	50.2	.29	19
Corn	16.4	.11	7
Fresh fruits, total ²⁶	95.0	3.26	211
Citrus, total ²⁷	67.0	1.34	87
Grapefruit.....	28.0	.39	25
Lemons, limes ²⁸	21.9	.07	5
Oranges.....	49.9	.88	57
Other than citrus, total ²⁹	88.9	1.92	125
Apples.....	46.7	.42	27
Bananas	60.2	.47	30
Melons	10.2	.29	19
Rhubarb.....	13.8	.09	6
Strawberries.....	27.3	.30	19
Avocados	3.1	.01	1
Berries other than strawberries.....	8.1	.05	4
Cherries.....	7.7	.05	4
Peaches.....	14.6	.11	7
Other	15.7	.12	8
Commercially frozen fruits and vegetables	33.7	.17	11
Fruits ³⁰	10.6	.04	2
Vegetables other than potatoes, total.....	28.4	.13	8
Beans, lima	5.2	.01	1
Beans, snap, wax	6.7	.02	1
Broccoli.....	6.5	.02	1
Peas.....	11.2	.03	2
Spinach.....	5.1	.01	1
Corn	3.9	.01	1
Other	10.6	.03	2

²⁵ Includes beets, cauliflower, turnips, rutabagas, and others not shown separately.

²⁶ Includes home canned and frozen fruits that were brought into the home in fresh form.

²⁷ Includes small amounts of tangerines and kumquats not shown separately.

²⁸ Chiefly lemons.

²⁹ Includes small amounts of figs and grapes not included in "Other."

³⁰ Chiefly strawberries.

TABLE XIII.--FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955--Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Commercially canned fruits and vegetables, total....	Percent	Pounds	Grams
	87.6	1.39	90
Fruits, except baby and junior foods, total.....	58.2	.48	31
Apples, applesauce.....	15.7	.07	5
Apricots.....	6.3	.03	2
Berries.....	4.6	.02	1
Cherries.....	8.2	.03	2
Peaches.....	23.0	.13	9
Pears.....	11.2	.05	3
Pineapple.....	19.8	.07	5
Plums, prunes.....	2.1	.01	1
Mixed fruit, fruit cocktail.....	11.4	.05	3
Other.....	4.9	.02	1
Baby, junior foods, incl. juices.....	8.9	.04	3
Vegetables, except baby and junior foods, total ³¹	79.8	.85	55
Asparagus.....	8.2	.03	2
Baked beans, or other mature beans.....	17.8	.09	6
Beans, lima, green, immature.....	4.2	.02	1
Beans, snap, wax.....	27.7	.13	9
Beets.....	10.0	.03	2
Corn.....	36.2	.16	11
Peas, green, immature.....	36.4	.15	10
Tomatoes, total.....	22.8	.11	7
Pulp.....	14.4	.08	5
Puree, paste.....	11.5	.03	2
Other.....	32.4	.13	8
Baby, junior foods, incl. potatoes.....	6.5	.02	2
Fruit and vegetable juices, fresh, frozen, canned, powdered ^{32, 33}	65.8	1.20	78
Canned citrus, total ^{32, 34}	24.6	.32	21
Orange.....	14.6	.21	13
Grapefruit.....	7.1	.07	5
Canned fruit other than citrus ³²	15.2	.15	10
Canned tomato and other vegetable juices ^{32, 35} ...	27.2	.23	15
Frozen, concentrated, total.....	26.7	.13	8
Orange.....	24.4	.11	7
Other.....	5.1	.02	1
Fresh (commercial).....	2.8	.04	2
Dried fruits and vegetables, total ³⁶	36.6	.12	8
Dried fruit, total.....	21.5	.05	3
Prunes.....	7.2	.02	1
Raisins, currants.....	12.1	.02	1
Other.....	4.9	.01	1

³¹ Includes small amount of mature peas not included in "Other."

³² Single strength equivalent.

³³ Does not include baby or junior juices. See above.

³⁴ Includes orange and grapefruit blend and other citrus juices not shown separately.

³⁵ Includes both commercially and home-canned and frozen juices.

³⁶ Includes both commercially and home-dried fruits and vegetables.

TABLE XIII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955—Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Dried fruits and vegetables—Con.		Percent	Pounds
Dry vegetables, total.....	20.5	0.07	4
Beans, total.....	18.2	.06	4
Lima.....	3.4	.01	1
Navy, pinto, kidney, other.....	15.6	.05	3
Peas, lentils, other.....	3.1	(*)	(*)
Beverages:		Percent	Grams
Coffee, total ³⁷	94.8	.27	17
Bean, ground.....	78.9	.25	16
Instant, powdered.....	23.0	.01	1
Substitute.....	3.8	(*)	(*)
Tea ³⁸	20.2	.02	1
Chocolate, cocoa, chocolate sirup, total.....	27.8	.03	2
Chocolate.....	7.6	.01	(*)
Cocoa.....	18.6	.01	1
Chocolate sirup.....	3.8	.01	1
Soft drinks, fruit ades, total.....	63.1	.96	62
Soft drinks, bottled and canned, total.....	55.2	.92	59
Cola-type.....	34.2	.53	34
Fruit flavored.....	13.3	.15	10
Other.....	21.4	.23	15
Powdered.....	10.6	.01	1
Fruit ades, total.....	7.5	.03	2
Frozen.....	4.8	.02	1
Other.....	2.9	.02	1
Miscellaneous foods:		Percent	
Nuts (shelled weight) and peanut butter, total.....	48.4	.09	6
Nuts (shelled weight), total.....	21.5	.03	2
Peanuts.....	7.3	.02	1
Other.....	15.5	.02	1
Peanut butter.....	37.3	.06	4
Soups, except canned baby soups, total.....	48.4	.25	16
Vegetable, total.....	33.5	.14	9
Condensed.....	29.6	.13	8
Other.....	4.2	.01	(*)
Meat, fish, grain, total.....	29.2	.11	7
Condensed.....	25.5	.11	7
Other.....	4.8	.01	1
Catsup, chili sauce, etc., total ³⁹	58.5	.12	8
Catsup.....	53.0	.10	6
Chili sauce.....	5.3	.01	(*)
Barbecue sauce, etc.....	6.4	.02	1
Tomato relishes.....	2.1	.01	(*)
Pickles, olives, relishes, total ³⁹	49.9	.20	13
Pickles.....	41.6	.17	11
Olives.....	15.0	.02	2
Relishes other than tomato.....	6.2	.01	1

³⁷ Includes small amounts of liquid concentrate coffee, not shown separately.

³⁸ Data refer to amounts bought during the 7-day survey period rather than the amounts used.

³⁹ Includes both commercial and homemade products.

TABLE XIII.—FOOD CONSUMPTION PER PERSON IN HOUSEHOLDS IN THE
NORTH CENTRAL REGION OF THE UNITED STATES, 1955—Con.

U. S. Department of Commerce

Food (1)	Households using (2)	Quantity per person	
		In a week (3)	Per day (4)
Miscellaneous foods—Con.		Percent	Pounds
Puddings, pie fillings, miscellaneous sweets (commercial), total ⁴⁰	47.4	0.10	7
Puddings, pie fillings ⁴¹	41.8	.06	4
Strained canned puddings (baby).....	4.1	.01	1
Sherbets, ices.....	6.6	.02	2
Icing mix, fudge mix	2.7	.01	(*)
Other mixtures, prepared or partially prepared, total.....	30.9	.17	11
Mixtures other than baby, junior foods, total... ..	25.8	.13	9
Without meat ⁴²	10.6	.04	3
With meat ⁴³	18.4	.09	6
Baby, junior foods, total.....	7.2	.04	2
Meat, mixtures with meat	6.7	.03	2
Without meat.....	2.1	.01	(*)
Leavening agents, total ⁴⁴	19.9	.03	2
Yeast	11.4	(*)	(*)
Other ⁴⁴	9.9	.02	2
Seasonings: ⁴⁴			
Vinegar	11.0	.07	4
Salt.....	20.8	.10	6

⁴⁰ Includes other miscellaneous sweets not shown separately.

⁴¹ Chiefly dry, including plain gelatin.

⁴² Includes spaghetti with tomato sauce, potato salad, cole slaw, macaroni and cheese dinners, chow mein and chop suey dinners, and others.

⁴³ Includes poultry and meat pies, spaghetti with meat balls, corned beef hash, chili con carne, ravioli, tamales, and others.

⁴⁴ Data refer to amount bought during the 7-day survey period rather than the amounts used.

ANALYTICAL REFERENCE SERVICE

The Public Health Service Robert A. Taft Sanitary Engineering Center conducts an Analytical Reference Service. A summary report of their activities is reproduced below. Inquiries concerning this service should be addressed to Mr. D. G. Ballinger, Acting Chief, Analytical Reference Service, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.

ANALYTICAL REFERENCE SERVICE ACTIVITIES

Robert A. Taft Sanitary Engineering Center
Public Health Service

INTRODUCTION

During the past few years, there has been an increasing need for Federal, State and municipal agencies to assess the radioactivity level in environmental samples such as air, food, vegetation, milk and water. In most cases it is desired to measure first the gross activity of the sample and then, where indicated, the activity of specific radionuclides. The measurement of gross activity is presently complicated by a number of factors such as choice of standards, technique of sample preparation, and type of instrument used for counting.

The Analytical Reference Service is a voluntary association of member organizations responsible for the conduct of laboratory analyses. Included are laboratories of state health departments, state water survey agencies, the larger municipalities, Federal agencies, industries and foreign countries. A list of the current membership is given in Table A-1.

Membership, acquired by written request, imposes no obligation upon the members but is an indication of their desire to participate in the cooperative study of laboratory methodology through the analysis of specially designed samples.

Through its operations, the Analytical Reference Service provides:

1. A statistical evaluation of procedures, including precision and accuracy.
2. An opportunity for a participant to compare his laboratory procedures and results with other laboratories having similar responsibilities.
3. An exchange of information regarding weaknesses of currently approved methods.
4. Evidence regarding methods requiring further development or perhaps entirely new approaches.
5. A framework for broad-scale evaluation of new analytical methods.

PLAN OF OPERATION

Initial efforts in the radiological area have been directed toward the determination of gross radioactivity in water. The scope of this phase of the overall program will be broadened gradually to include other environmental media and the determination of specific radionuclides.

Using standardized radionuclide sources, samples are prepared containing measured amounts of the desired constituent. Decisions as to the qualitative makeup of any particular sample follow suggestions from the members and from the staff of the Sanitary Engineering Center.

After a sample is designed and prepared, a notice announcing its availability and qualitative makeup is sent with a self-addressed reply card to member organizations. An affirmative reply initiates immediate shipment of a portion of the described sample. Results are requested within some reasonable period, usually sixty days.

REPORTING OF RESULTS AND COMMENTS

Data are returned to the Sanitary Engineering Center on forms supplied with the sample. Space is provided on the forms for numerical values and a narrative critique of analytical procedures used.

The results obtained by the cooperating laboratories are compiled in a final report. From examination of the combined data, it is hoped that reliable estimates may be made of the accuracy and precision of the methods employed.

All laboratories are strongly encouraged to supply comments on the analytical methods they use. A complete log of pertinent details, including difficulties, modifications, sources of error, and other factors, is extremely valuable. Such a compilation of comments represents an exchange of ideas and opinions that is a significant part of the final report.

Sample Number One

The first radiological sample prepared by the Analytical Reference Service was natural water, to which had been added a carefully measured amount of the beta emitting radionuclide Thallium-204. For a number of years this nuclide has served as the principal reference source for establishment of the efficiency of counting equipment used in routine water monitoring. The particular objectives of this initial study were set down as follows:

1. How accurately is radioactivity at normal or background levels being determined?
2. What factors affect accuracy?
3. Is there a well-defined need for standardization of sample preparation and counting techniques?
4. Does the type of instrumentation affect the results significantly?

Results of Reports on Sample Number One

Actual concentration of radioactivity in the sample was 5.44×10^{-7} uc/ml. The spread in reported concentrations ranged from 0.3×10^{-7} uc/ml. to 8.23×10^{-7} uc/ml, and only approximately half of the participating laboratories were able to obtain results within 15% of the known concentration.

A number of variables were observed in sample preparation techniques employed by member laboratories. Those principally affecting the results were:

1. Sample Temperature of Drying
2. Type of Counting Instrument
3. Standard Used in Calibrating Counting Equipment
4. Volume of Sample.

A summary of the results on this sample is shown in Table A-2.

Sample Number Two

In the preparation of a second sample, an attempt was made to eliminate certain of the variables noted in the initial study. This was done by suggesting the sample volume to be used and general preparation procedures to be followed.

The radionuclide used in the preparation of Sample Number Two was cesium-137. The use of Cs¹³⁷ was suggested by members of the staff of the Analytical Chemistry Division at the Oak Ridge National Laboratory. This radionuclide (and its daughter, Ba^{137m}) emits gamma as well as beta radiation, and has a long half-life--two features which make it rather ideal for purposes of a study of this type.

Results of Reports on Sample Number Two

The standardization concentration in the sample was 6.7×10^{-7} uc/ml as beta activity and 5.0×10^{-7} uc/ml as gamma activity. Although the spread in data was just as great as for Sample Number one, in general the results reflected improvement, as shown in Table A-2. Preliminary evaluation indicates that, of 42 participating laboratories, over one-half reported concentrations within $\pm 15\%$ of the known amount, while almost 75% were within $\pm 25\%$. These data are currently being analyzed more in detail and a final report will be issued by the Sanitary Engineering Center within the next six months.

COUNTING STANDARDS

Because a number of the laboratories participating in the study on Sample Number Two have requested assistance in the calibration of their counting equipment, the Analytical Reference Service has recently prepared standard solutions of Cs¹³⁷ for their use. Using these solutions, each laboratory will be able to prepare a series of calibrated samples which should enable them to obtain accurate data on the self-absorption and efficiency characteristics of typical samples counted using their present equipment. This, in turn, should lead to more accurate data submitted during future studies of this type and in the data being obtained by these laboratories on environmental samples.

COMMENTARY

On the basis of the two radiological samples studied to date, it would appear that the participating laboratories, as a group, are improving in the field of radiological examination of water for gross activity. However, much work still remains to be done. This includes not only the selection and preparation of counting standards but also the preparation and counting of the samples themselves.

Once gross measurements in water assume an acceptable degree of accuracy, specific radionuclide determinations will be investigated and, at the same time, these studies will be extended to include other environmental media.

TABLE A-1

ANALYTICAL REFERENCE SERVICE MEMBERS AS OF MAY 1, 1960

<u>State Agencies</u>	
Alabama Water Improvement Commission	Dayton Department of Service and Buildings
Arizona State Department of Health	Philadelphia Suburban Water Company
Arkansas State Board of Health	Philadelphia Water Quality Control and Research
California State Department of Public Health (Berkeley)	Division
California State Department of Public Health (Los Angeles)	St. Louis County Water Company
California Department of Water Resources	
Connecticut State Department of Health	
Florida State Board of Health	
State of Hawaii Department of Health	
Idaho State Board of Health	
Illinois State Department of Public Health (Chicago)	
Illinois State Department of Public Health (Springfield)	
Illinois State Water Survey Division	
Kentucky State Department of Health	
Louisiana State Health Department	
Maryland State Department of Health	
Maryland State Water Pollution Control Commission	
Michigan State Department of Health	
Minnesota State Department of Health	
Missouri Department of Public Health & Welfare	
Montana State Board of Health	
Nebraska State Department of Health	
New Hampshire Water Pollution Commission	
New Jersey Department of Health	
New Mexico State Department of Public Health	
New York State Department of Health	
New York State Conservation Department	
North Carolina State Board of Health	
Ohio State Department of Health	
Oregon State Board of Health	
Pennsylvania Department of Health	
State of Rhode Island and Providence Plantations	
South Carolina Water Pollution Control Authority	
South Dakota Department of Health	
Tennessee Stream Pollution Control Board	
Texas State Department of Health	
Utah State Department of Health	
Vermont State Department of Health	
Vermont State Water Conservation Board	
Virginia State Health Department	
Virginia State Water Control Board	
Washington State Department of Health	
West Virginia State Water Commission	
Wisconsin State Board of Health	
<u>Municipal Agencies</u>	
Metropolitan Water District of Southern California	
Los Angeles Department of Water and Power	
Los Angeles County Flood Control District	
Chicago Department of Water and Sewers	
Flint Department of Public Works and Utilities	
<u>Federal Agencies</u>	
Tennessee Valley Authority, Wilson Dam, Ala. (Lab I)	
Tennessee Valley Authority, Wilson Dam, Ala. (Lab II)	
Tennessee Valley Authority, Chattanooga, Tenn.	
U. S. Army Environmental Health Laboratory, Army Chemical Center, Md.	
Sanitary Engineering Division, 13th Naval District, Seattle, Wash.	
U. S. Dept. of the Interior, Geological Survey, Sacramento, Calif.	
U. S. Dept. of the Interior, Geological Survey, Denver, Colo.	
U. S. Dept. of the Interior, Bureau of Reclamation, Denver, Colo.	
U. S. Dept. of the Interior, Geological Survey, Columbus, Ohio	
U. S. Dept. of the Interior, Geological Survey, Philadelphia, Pa.	
U. S. Dept. of the Interior, Geological Survey, Washington, D. C.	
<u>Universities</u>	
Georgia Institute of Technology, Dept. of Applied Biology	
Purdue University, Department of Chemistry	
Rutgers University, Department of Sanitation	
Case Institute of Technology, Dept. of Civil and Sanitary Engineering	
University of Pittsburgh, Graduate School of Public Health	
<u>Industry</u>	
American Cyanamid Company	
California Water Service Company (San Jose)	
Central Farmers Fertilizer Company	
Dearborn Chemical Company	
Ekroth Laboratories, Inc.	
Food Machinery & Chemical Corporation	
Goodyear Atomic Corporation	
Monsanto Chemical Company	
National Aluminate Corporation	
Sandia Corporation	
<u>Foreign</u>	
Department of National Health and Welfare (Vancouver, B. C.)	
Department of National Health and Welfare (Ottawa, Ontario)	

TABLE A-2

COMPARISON OF DATA ON RADIOLOGICAL SAMPLES NO. 1 AND NO. 2

Percent spread from actual value	Sample No. 1 (Tl^{204}) (26 laboratories reporting)			Sample No. 2 (Cs^{137}) (42 laboratories reporting)		
	Spread $\mu c/ml \times 10^{-7}$	Number of results in each spread	Percent of total number of results	Spread $\mu c/ml \times 10^{-7}$	Number of results in each spread	Percent of total number of results
$\pm 10\%$	4.90-5.98	8	31%	6.03-7.37	18	43%
$\pm 25\%$	4.08-6.80	16	62%	5.02-8.38	32	76%
$\pm 50\%$	2.72-8.16	20	77%	3.35-10.05	38	90%
$\pm 75\%$	1.36-9.52	23	88%	1.68-11.72	41	98%

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